DIRECTIONS K

FOR

THE USE

OF A

SCIENTIFIC TABLE,

IN THE

COLLECTION

AND

Application of Knowledge.

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THE purſuits of literature are directed towards two objects: 1ſt. The accumulation of Knowledge. 2dly. The application of it.

No one man is inferior to another in the accumulation of knowledge owing to the want of opportunity. In this crowded univerſe of things, in this endleſs ſucceſſion of complex and active ſcenes rapidly following each other in multitudes, it is impoſſible for our obſerving ſenſes ever to experience a blank. Every moment of our lives may be buſily employed in examining, deſcribing, and recording. What I have ſaid is equally true of the thouſands who live now, as it is of thoſe who may live for countleſs centuries to come. The ſtore from which we may draw is that of infinitude. The varieties by which we may be intereſted and delighted are thoſe of boundleſs ſpace, teeming with preſent wonders and with never ending changes.

Poverty, with regard to knowledge, is not more rarely connected with dearth of opportunity, than with deficiency of capacity. With ears and eyes, and other ſenſes capable of impreſſion, it is impoſſible that a flow of ideas ſhould not pour continually into the mind. But whatever enters and impreſſes may be retained, unleſs cauſes operate very different from a defect, either of memory or intellect. Few are the perſons who have not learnt things that require much more exertion and energy, than the moſt exalted acquirements of literature. There is no individual portion, perhaps there is no ſeparate branch of ſcience that demands ſo much mind as the ſpeaking of a language, and yet to be ignorant of a language is the lot only of complete ideotiſm or childiſhneſs. But if neither the defect of capacity, nor that of opportunity, makes man poor in knowledge, to what ſhall we aſcribe a poverty, which is actually more general than any other? I will briefly explain its cauſes. From an acquaintance with theſe you will diſcover the deſigns of that plan both as a whole, and in its ſeveral parts, which I have purſued myſelf, and which I ſhall recommend to your toil, till you have invented or learnt ſomething better.

1. One very common cauſe of ignorance, is the want of that intereſt in occurring objects which is neceſſary to fix the attention upon them, or which faſtens the attention ſo long upon them as to render their impreſſions permanent. In the multitudinous pageantry that paſſes each inſtant in review before our

ſenſes, every part that is not detained and arreſted to be looked at over and over, ſinks into oblivion. But the human being will never take the trouble, nor will he ever exerciſe the ſelf-denial, of interrupting the gratification of gazing in idleneſs and vacancy, unleſs prevailed upon by the influence of a hope, or a remembrance more powerful than the feeling of the moment. If this be true, we have one queſtion only to aſk, Whence muſt the influence I allude to proceed? It certainly is not the reſult of much labour or inveſtigation, for we often ſee the minds of the moſt indolent and uncultivated characters, ſuddenly abſorbed by particular objects, and ſo much engaged, as not to be torn from their contemplation without violence. It certainly is not the effect of great talents, for the perſeverance obſervable in the moſt ſilly viſionary, is frequently that of aſtoniſhing zeal and obſtinacy. Neither is it the property of years, nor any peculiarity of external circumſtance, for there is no age or condition in which it has not been felt; we may conſequently regard it as inſeparable from the ſtructure and compoſition of the human ſyſtem. Now there are but few powers that are univerſally the properties of man; perhaps, the diſtinction is that of aſſociation alone, and for this reaſon, in conjunction with many more, equally ſtrong, I would fix upon the power of aſſociation as anſwering our preſent queſtion. The images of the human mind bear a ſtriking reſemblance to all thoſe things in nature, whoſe life depends upon their ſtability. The roots of a ſingle blade of graſs branch out and mingle with thoſe of a hundred different plants, in whoſe nutrition it ſhares, by whoſe adheſions it becomes ſtedfaſt, and with whoſe diſaſters it ſympathizes and languiſhes. In like manner, our naſcent ideas become permanent, when they ſhoot into the ſubſtance of many others that are already formed and eſtabliſhed; with theſe they immediately acquire a common intereſt, ſo that not one of the ſociety is ever called into action, without a contemporaneous activity in all the reſt. In proportion, however, to the extent of connexion or aſſociation in this caſe, ſo will the probability be of having the attention fixed by tranſient objects; for if the ſenſibility of any one thought cannot be touched without an inſtantaneous effect on a multitude of other ſenſibilities, to which it is allied, then that one thought can never come forward without intereſt; at leaſt, what a chance is there when its vibrations ſpread through a ſea of combuſtible elements, that it will diſturb the reſt of what, when moved, becomes active, or that it will kindle a train leading to ſome grand repoſitory of delights and energies? It is not, however, more clear from theory, that the attention can never ſleep where our aſſociations are numerous, and that no object can be inſignificant in its appearance, when extenſively connected, than it is from the moſt common and obvious experience.

A maſs of unformed dirt often becomes the ſubject of many years inquiry. Nay, there is not a ſolitary rock, or worn-out trunk, that may not be raiſed to an immortal ſtation on the canvas of the painter, or in the ſong of the poet. The lover will, long after he has ſeen it, deſcribe the leaves, the branches and the bark, the ſize, ſituation and form of a particular tree, if it be connected in his memory, with the careſſes and ſmiles of his miſtreſs. In like manner, would not you recollect as much of every tree, if its peculiarities intereſted you, becauſe you are hunting after their deſigns, or if the form of its branches be aſſociated, in your mind, with the general law of its growth, or if the corrugations of its bark led you to the cauſe which produced them, or if a paſſion for the fine arts induce you to examine and compare the varieties of its appearance, with a view to ſelection and future application? Again. What is there aſtoniſhing in the contemplation of years fixed on a pebble or a ſod, when we know that the object may be aſſociated in the fancy with the phyſical revolution of the world, with operations that have taken place thouſands of years ago, or with inquiries which have engaged the labours of philoſophers for whole centuries.

In ſhort, as there is not an object in the univerſe that is not capable of kindling unnumbered aſſociations; ſo there is not an object in the univerſe that may not be inveſted with influence the moſt powerful over the human attention. It is clear, from what I have juſt ſaid, that as our ideas multiply, ſo muſt the probability increaſe of that faſcination which I have juſt mentioned; and conſequently, that as our ſtores grow, ſo does that capacity ſtrengthen, by whoſe means we collect thoſe ſtores. How ſtrongly does this concluſion urge the importance of beginning to gather ideas as ſoon as poſſible. It urges, with equal force, the importance of every ſingle idea we form, and the inducement by which a man, abſolutely ignorant, is invited to ſtudy, with labour and patience, any one thing that comes before him. If he would but now and then ſit down with reſolution, to ſurvey the laſt impreſſions on his memory, or to fix his mind on the leading acts and appearances that have occurred in his moſt common avocations; he would ſettle a certain quantity of materials in his own poſſeſſion, and he would not live many days before new materials would bring them into activity, and make them the means of intereſt, or of thought, in caſes which would otherwiſe paſs by inſipidly and without obſervation.

I proceed to ſhow that a ſecond cauſe of ignorance is the oppreſſive feeling, that the effort to know is that of a taſk tedious and rarely productive. I ſhould much queſtion the prevalence of this feeling in any caſe, if by thoſe who ought to repreſs and ſubdue, it were not foſtered and cheriſhed. It is natural for the pride of man to magnify whatever he is excluſively poſſeſſed of. It is natural, therefore, for literary men to miſrepreſent what they have acquired in their early years, and by this means to place thoſe who have not the acquiſition, at as great a diſtance as poſſible, below themſelves. They conſequently ſwell the difficulties they have conquered to a moſt enormous ſize; and by thus deterring every diſpoſition to approach them, ſecure a monopoly, of all others the moſt gratifying. We ſhould always doubt the report of thoſe whoſe paſſions are intereſted in deceiving us. This is clearly the caſe with thoſe who crowd the avenues to ſcience with obſtacles and diſcouragements.

Inſtead, then, of ſhrinking at a diſtance before the authority of their aſſurances, inſtead of being chilled with awe by their language, as that of oracles, let us examine it by the teſt of reaſon, and regard it only as far as it is reaſonable. By what means did they enter the temple of ſcience? Can they pretend to have had more induſtry at an age, when their eſtimate of knowledge muſt have been little or nothing, and when their deſires muſt have been proportionably feeble, than is poſſible for thoſe, whom experience has already impreſſed with the value of what they wiſh to obtain? Is there any one circumſtance, in the hiſtory of children, more favourable to patience and perſeverance than that of grown perſons; or when it is certain, that an hour or two employed every day for three or four years, with an attention diſtracted, and with a mind more eager to finiſh than to improve, has given them all their diſtinctions, Is it credible that the ſame number of hours employed, during the ſame ſpace of time in advanced life, ſhould not be equally productive? As far, then, as labour and perſeverance are eſſential, ſo far it is certain, that education may begin at twenty, with a proſpect of ſucceſs, not leſs ſure than that of twelve or fourteen. Nay, the reaſoning I have uſed may be applied, with a propriety equally forcible, to thoſe who have reached the age of thirty, forty, or fifty. If a man, in the natural courſe of things, may expect to live ten years, is it not worth his while to labour for three or four years, for the ſake of enjoying the pleaſures of knowledge and an improving mind for the remainder of his years? It may be ſaid that an introduction to the ſciences is a ſeries of very dry and unintereſting proceſſes, through which a child's mind only can paſs, in conſequence of dreading puniſhment, or of wiſhing to be releaſed from confinement. This is by no means true. The barbarous prolixity and clumſineſs of paſt ages have ſwelled our grammars into folios. But this tumeſcence is not eſſential to them. They have been already, cleanſed and reduced to a twentieth of their firſt ſize; and a much greater reduction is ſtill poſſible.

Beſides, it, by no means, follows, that the ſtudy of grammar ſhould be tedious. There is, in the adaptation of rules to the inſtances they illuſtrate, a ſomething highly gratifying to the human mind; and the learning of grammar may be made wonderfully pleaſant, by thoſe who have art enough to employ this adaptation, with its poſſible effect. The connection of etymology with grammar is another thing, which takes off from its tædium. There is no hiſtory more agreeable than that of language; and while its numerous circumſtances are ſo many ſources of gratification, they are, likewiſe, ſo many hooks, by which words may be faſtened to the memory. Beſides, the folly of cuſtom has too long ſeparated, in our modern ſyſtems of education, the acquiſition of grammar from that of the language. It has often happened, that a boy has been four years learning rules only, and, by endleſs repetition, driving into his memory what would be much more laſtingly and eaſily impreſſed, by forming an aſſociation between them and the inſtances they illuſtrate. I would add, that experience is directly oppoſite to all that has been ſaid about the excluſive probability of early life, with regard to language. You will frequently meet with perſons who, in advanced life, within a very ſhort ſpace of time, have acquired three or four modern languages, when impelled by the neceſſities of trade only. And I know no difference between the acquiſition of a modern and an ancient tongue, excepting that the intereſt of mankind has improved the art of teaching the modern more than it has done that of the ancient. Admitting, however, that the dry work alluded to is the privilege of thoſe who have been flogged and cuffed, poiſoned by bad air, and depreſſed by the moſt relaxing and debilitating confinement, for ſix or eight years, in our common ſchools. This admiſſion will, by no means, juſtify the prejudice I now wiſh to remove. Is there no knowledge but that which is acquired through the medium of the dead languages? Is the temple of ſcience open only to the Greeks, or to thoſe who underſtand them when they ſpeak? Are there no interpreters, of whom we can avail ourſelves; or has knowledge no language but their's? Alas! what can be known by thoſe who are not ſcholars, is an infinitude, compared with that which the ſcholar alone can know; and the queſtion is reduced to this, Whether we can open our eyes to the view of this infinitude, when our youth has not been diſciplined in ſlavery and confinement? It may be ſafely aſſerted, that there is nothing, in the whole circle of ſcience, unattainable by a man, converſant with the elements of geometry. And who cannot learn theſe? Who is too old? Who too vulgar? Who too buſy? I have known a child acquire them in three months, at the age of eleven. One of our countrymen, who was afterwards ranked amongſt our firſt mathematicians, acquired them at forty. I have often found them moſt completely poſſeſſed by the day labourer and the artizan. And I have ſeen thoſe, who, in advanced life, have acquired them in a few days. The elements of geometry have that in their connections and deductions, which is highly gratifying to the human mind, and ſo impreſſive is their character, that, if once learnt thoroughly, they are ſcarcely ever forgotten. It ſhould be added, that they have an abſtracting influence. They faſcinate and chain the mind that attends to them; and there is nothing in the moſt buſtling avocations, that can interrupt thoſe who wiſh to underſtand them. Indeed, I can hardly conceive it poſſible, that any perſon ſhould be unable to poſſeſs this grand introduction to ſcience, within a very few weeks, if he have but half an hour's leiſure in each day: and if he have it not, he ought, in conſcience, to declare immediate war, either againſt his own character, or his own circumſtances.

It may be ſaid, that there are peculiar habits, neceſſary to an improvement in knowledge; and that we muſt acquire theſe when confined to one purſuit, which is the caſe with children in ſchools: they are there chained to their books. There is no diverſity of character in the object of their attention. Their whole mind becomes impregnated with ideas of one ſpecies, and they are broken, as it were into a regularity of literary employment. There is no accuracy, either in the repreſentation, or the reaſoning, of the language I have now uſed. No minds are more eager to wander than thoſe of children. This is the kind diſpoſition of nature; for without the relief of variety, the intellectual principle is actually killed, or it is frozen into a pigmy: beſides, the reſtraints of children moſt commonly form aſſociations in their minds, very unfavourable to knowledge; and hence, the moment they quit ſchool, they are eager to ſell their books, and to throw off their habits of ſlavery. But, admitting the truth of the obſervation juſt urged, in all its force, as far as it reſpects children, there is ſtill a great deal to be proved, before the obſervation can be made at all pertinent. And are children alone capable of forming new habits? Is the poſſibility of beginning a new courſe of conduct, and of attaining eaſe and promptitude in the execution of it, peculiar to any age? If ſo, then the human being always enters upon the buſy ſcene of life in fetters, and all hopes of change of character are loſt as ſoon as he begins to ſhow it. Beſides, experience is directly repulſive of theſe abſurdities. Do not we ſee men acquiring vicious habits at all ages. And are men confined to the capacities of miſery only? Can they be permanent only in the conduct of wretchedneſs and profligacy? On the contrary: Do not we obſerve that the human being riſes and falls in the eſtimate of the moraliſt, juſt as circumſtances become more or leſs favourable to character? Is not every man ſenſible to himſelf, that his habits of the preſent year are by no means thoſe of former years. In ſhort, that they continue the ſame only when no variety takes place in his ſituation, or employment, or views; and that they are as changeable as the accidents which diverſify his condition.

It ſhould be added. that habit is nothing but a readineſs of action, ariſing from a frequent repetition of the ſame deed. And what this repetition produces in one, it muſt produce in every period of life. The ſtrength of ſuch habits as are previouſly formed, muſt, it is true, make ſome difference. But I do not perceive why the difference they make ſhould be to the diſadvantage, rather than the advantage of knowledge. For if you have a habit of induſtry, or patience, or punctuality, in one purſuit, it will certainly be of ſervice in every other: and what habits additional to the preceding can you have that are not vicious, or that, with the hope of giving information, exclude every other hope that is favourable to the happineſs of man? Indeed, I am not addreſsing myſelf to the profligate and unprincipled. It is one thing to reclaim; it is another to improve. I am addreſſing myſelf to thoſe, whoſe diſpoſitions and deſires are right. And whoſe only difficulties ariſe from wrong notions, or the defect that proceeds from negligence. I cannot, however, quit this part of my ſubject, without appealing again to the general teſtimony of experience. I once knew a gentleman who retired from buſineſs at the age of forty-five; he had no idea that connected happineſs with the dull, the ſolitary, and the idle tranquillity of the country. He ſtaid among his old acquaintances in the metropolis. He hoped to derive from the converſation of literary men, ſuch an addition to the ſtores of his own mind, as would ſoon enable him to enter into their diſcuſſions, to be improved by the colliſion of his own with the opinions of others, and, now and then, to triumph in ſubduing error, or in conquering difficulty. But, he ſoon found, that the converſations he had recourſe to were altogether unintelligible. Scarcely any thing came forward; which was not related to ſomething unknown to him; and thus, in the midſt of light, he continued in darkneſs. The ſubjects his friends converſed about were chiefly ſcientific. He therefore determined to undergo the diſcipline of teaching himſelf in the ſciences. In two years he thought he might, at leaſt, underſtand moſt of the technical terms. And with the aid of ſuch ſtepping blocks, he indulged the hope of very conſiderable progreſs. The labour of a few weeks put him in poſſeſſion of Euclid. Within the year he was ſtudying the Principia of Newton; and in leſs than two years he was amongſt the firſt philoſophers of the country. In the meetings he attended, were ſeveral philologiſts, who frequently occupied the evening with ſubjects, which a man of mere ſcience could not enjoy. Mr. C. obſerving, that the literature of France and Italy chiefly engaged their converſation, determined to learn one of theſe modern languages; and from the acquiſition of this, he proceeded to that of the other; and in a ſhort time he ſpoke French and Italian exceedingly well. Soon after this attainment, he became acquainted with two or three claſſical gentlemen. They gave a new character to the prevailing diſcuſſions of the meetings which he attended. And Mr. C. was, again, in the dark. But his ſucceſs in the various purſuits he had undertaken, determined him to try whether he could not learn Greek and Latin. Children (ſaid he) have their time chiefly engroſſed by learning quantities. I will omit them and ſtudy the languages, as if I never meant to ſpeak them. By the ſteady labour of an hour or two every day, he was ſoon enabled to read all the common claſſical books: but he was ſtill dumb; for he could never quote a paſſage without the dread of expoſing himſelf. He, finally, reſolved to go through the drudgery of learning proſody. By the age of fifty-two, he was not only one of the beſt philoſophers, but was reputed to be one of the beſt ſcholars, of his time. He lived to ſeventy; and for eighteen years enjoyed all the luxury of learning and of a philoſophy, which, at the ſame time ſtrengthened his mind and enriched his character.

I do not ſay that every man can do as much as Mr. Collins; but every man may have *his* labour and patience; and in a certain, if not in an eminent, degree, the enjoyments by which they were rewarded. I have lately ſeen many inſtances of various kinds, which corroborate the teſtimony of the preceding. I know two phyſicians who began to travel at ſixty, and to ſtudy ſubjects, not only new, but different, in every reſpect, from thoſe with which they were profeſſionally acquainted. They came home at the end of a few years, having their minds loaded with ideas, not one of which they poſſeſſed before. Surely, if a perſon at any age can open his eyes and ears with effect abroad; he may do the ſame at home. But why enlarge here? Let any man, at the end of his ſixtieth year, review the ideas of that year, and he will find, that the new information he has acquired from occurring events, is much ſuperior to that of any knowledge preparatory to ſcience. And that the ſame degree of intellectual exertion under the direction of wiſdom harmonizing its effort, would be infinitely more beneficial, than the accidental effects of accidental impreſſions.

I am now led to the conſideration of a third cauſe of permanent ignorance. Numerous are the perſons who, after having reſolved, never advance, owing to the embarraſſment they feel about the firſt meaſures they ought to ſelect; or about the firſt ſteps of their intended progreſs. Be the number or the ſtrength of ſtimulants, applied to the mind, ever ſo great, while they impel different ways, they may be attended with as much inactivity, as that which accompanies the greateſt inſenſibility. Hence, when crowded varieties of purſuit invite, with oppoſite claims, to preference, the idleneſs and ignorance of years will continue unchanged; and the inceſſant impulſe of our good wiſhes will be followed by nothing, but perpetual heſitation about the preſent, and perpetual reſolutions about the future. I would be far from aſcribing this evil to the perſons who ſuffer it. The chief cauſe of it is the vague and indeterminate language, received from thoſe who are generally applauded in ſuch caſes, for inſtruction and aſſiſtance. By ſome, one mode of beginning, by others, a different mode is recommended. It is the direction of ſome, that a certain number of popular authors be read; of others, that we immediately enter upon ſome popular purſuit of ſcience. But the admonitions of all are uſually ſuggeſted, by what is moſt pleaſing to thoſe who give, and not by what is moſt advantageous to thoſe who aſk them. Thoſe who have read much and thought little, recommend the Spectator, Tatler, the Idler, &c. and thus plunge and bury the inquiſitive mind in all the dullneſs and confuſion of Engliſh literature. The moſt common lovers of ſcience are thoſe who give it to the details of natural hiſtory: and it is their importunate advice, that an immediate hunt ſhould take place through all the ditches and underwoods of the neighbourhood. I have known a metaphyſician put into the hands of Ignorance, juſt opening its eyes, Dr. Hartley's Theory of the Mind; and a theologian will think no enquiry important, but that which embitters the writers who have contended about the Trinity and the doctrine of redemption. Is it, then, aſtoniſhing, that knowledge ſhould ſoon be repudiated by thoſe who have not the paſſions of their directors, as an object of diſappointment; or that the dark repoſe of indolence ſhould become preferable to the fruitleſs toil of ſolving puzzles and enigmas?

The wiſdom of the Greeks has, I think, fixed upon the firſt thing to which every inquiſitive mind ſhould be directed. "Let no one, who is not a geometrician, enter here," was the motto which they inſcribed over the portal, leading to the temple of ſcience. Agreeably to their example, when I am aſked by the ignorant, What ſhall I begin with? I aſk, in my turn, Have you read Euclid? If not; before you make a ſingle effort, give to him the attention of a few weeks. He will initiate your minds into the true order of enquiry and inveſtigation. He will habituate you in the beſt art of reaſoning. He will give you an accurate taſte for purity and correctneſs of evidence. He will gradually train you to intellectual exertion. He will feaſt you with the delicious relief of diſcovering truth, juſt as it burſts, out of puzzling darkneſs, and miſery. He will open your minds to that vaſt, that boundleſs application, of which a few principles, well ſtudied and directed, are capable. Above all, he will give you a key to all the ſecrets of ſcience, and all the wonders of philoſophy.

If we mean to intereſt deſire in any purſuit, it is neceſſary that among our firſt efforts there ſhould be very few, whoſe intention is not obvious, and whoſe effects are not, in ſome degree, gratifying. Hence proceeds the reaſonableneſs of urging an introduction to ſcience, as a firſt meaſure, in preference to that of claſſical literature. In the former, the definitions, the axioms, and the poſtulates, include all the taſteleſs drudgery that is neceſſary; and this taſteleſs drudgery is at end within a few hours. In the latter, you have not only the declenſions, the pronouns, the tenſes, and their varieties in the ſeveral moods, but you have a large ſtock of words, likewiſe, to beat into the memory, before the leaſt gratification is poſſible. Beſides, the elements of Geometry, are a ſcience in themſelves; and as ſoon as you enter upon them, you taſte, in a degree, the moſt exquiſite enjoyments of literature. Whereas, when you have employed, at leaſt, fifty times more labour to get a language, its application is ſtill untaſted. This impulſe to further progreſs is to be the conſequence of a diſtinct ſeries of efforts.

It is, however, poſſible, that the little exertion, requiſite for what I urge as the firſt meaſure, may overwhelm the reſolution of ſome individuals. It is poſſible, that the luxury and laſſitude of habitual indolence, may overpower all its inducements. It is poſſible, that a conviction of its being that valuable attainment, which for twenty, thirty, or forty years to come, muſt be continually adding to the ſtores of intellect, to the elevation of character, and to the exquiſiteneſs, as well as the refinement, of human pleaſure, may not be powerful enough to forward the naſcent motions of improvement. In ſuch a caſe, I have witneſſed the effect of one obſervation, when every other has failed. Are you contented that your children ſhould deſpiſe you for your ignorance or your folly? To avoid a diſgrace ſo mortifying, would you not ſtrive, each day, to acquire only what a child of eleven or twelve years old can comprehend? You will ſee, that by the tuition of a maſter who attends him half an hour every morning, he will learn the elements of any ſcience in eight or ten months. It is poſſible, that, by devoting the ſame portion of time with the ſame regularity, you might have proceeded both as his tutor and your own. It is certain, that, in a much leſs ſpace of time, you may keep pace with him, and ſave yourſelf from an inferiority that will be frequently, if not conſtantly, wounding you.

Reflect here on the inſignificance of the required trouble, and compare the value of the advantages you may ſecure. The pleaſure of the attainable improvement is double, it is that of your own, and that of the objects, in whom you are moſt intereſted. Nor is its benefit confined to its immediate effects. When you have attended the progreſs of one child, you will recur, for a repetition of the gratification, to the employment of teaching the reſt. And you will thus give permanence to the ſtores of your own mind, while you renew the indulgence of your beſt affections.

There are two caſes now to be ſuppoſed. If our commencement and career be that of great induſtry, ſpirit and perſeverance, we ſhall ſoon find ourſelves at thoſe limits which education commonly reaches. We ſhall ſoon find all the common branches of ſcience within our graſp. How are we then to proceed; or where are we next to begin. The appearances of organized life are before us. The actions of our fellow creatures are perpetually intereſting our attention. Nature is inceſſantly aſtoniſhing us by new changes. The effects of unnumbered powers are each moment developing themſelves in the material ſyſtem. The ſurrounding univerſe is an infinitude of wonders. What are we to look at firſt? What is to be the order of our enquiries? What that direction which will afford moſt to the pleaſure and to the ſtores of our memories? It has always appeared to me, that the man who, with ſkill, will anſwer theſe queſtions, is to be ranked amongſt the firſt benefactors of his ſpecies. But it has likewiſe appeared poſſible, that he may manage his anſwer ſo, as, at the ſame time, to meet both the caſes I have juſt alluded to. It has often happened, that the moſt willing induſtry has been unſucceſsful in ſtudying Euclid's Elements. I knew a gentleman, who ranked high amongſt the authors of his day, but who, notwithſtanding, declared, that after unnumbered efforts, he could never comprehend the meaning of an angle. During the twelve years of my own experience, as a tutor, I have met with ſeveral inſtances, in which ſome of the beſt claſſical ſcholars, after many a violent ſtruggle, have given up the elements of geometry, as a ſomething beyond their capacity. I ſhall not enter into the cauſe, from which theſe failures proceeded. When they take place, are the unſucceſsful to be excluded from thoſe ſources of knowledge, which I have juſt mentioned; or is there not a method of enquiry, of arrangement, of ſelection, and of retention, which is the beſt poſſible for thoſe who have, and at the ſame time for thoſe who have not, the means of mathematical ſcience? The plan, which will be explained preſently, was deſigned to be thus general in its uſe. It ſuppoſes no previous knowledge. It ſuppoſes every previous knowledge. It, at leaſt, *endeavours* to unite the ignorant and the learned in one common labour, for the ſervice of philoſophy.

The fourth is the laſt cauſe of permanent ignorance, of which I ſhall, at preſent, take notice. In a country, where property is conſidered as the firſt eſſential of happineſs, and great property as the fountain of all diſtinction and eminence, the improvement of the mind will always be an object of inferior conſideration. In the purſuits of profit a juſtification will be found for the moſt perfect contentment in ignorance: and no defect will be conſidered ſo odious and contemptible, as that which threatens poverty, or even a mediocrity of wealth. This tyranny of folly and ſelfiſhneſs familiarizes our ears to the excuſes of thoſe, who plead they have no time; that buſineſs muſt be minded; and that they leave ſtudy for thoſe who have more idle hours than themſelves. I am often at a loſs which to admire moſt, the falſhood, the arrogance, the quackery or ſlavery, of this language. For I have never yet ſeen an inſtance, in which it has not been marked by one, by ſeveral, or by all theſe qualities.

Few are the leading men of occupation who give more than five hours a day to buſineſs. I believe two thirds of their hours to be generally ſquandered upon pleaſure and diſſipation. In the morning, they are abſorbed in laſſitude, or ſick with the dregs of intemperance. During noon, they figure away in the parade of employment. And very early is their retirement to prepare for the banquet, for its beaſtial groſſneſs, its delirious or ſtupifying intoxication, and the whole train of ſenſualities, which generally fill up their evenings. However, it is not in this inſtance alone, that the excuſe is falſe. Thoſe who are really and buſily occupied, a certain portion of time, will ſpend the remainder in perfect vacancy. They will doſe, for hours, over the bottle; or they will loll, in ſomnolence, on horſeback; or they will ſtupify themſelves at ſome ſilent and lazy diverſion. How fruitful of gratification would all theſe hours be; if the mind had ſome reſources in itſelf; or if it had ſome aſſociations to be quickened, beſides thoſe which inflame the paſſions, intoxicate the ſenſes, or vex the anxieties. How fruitful of gratification would theſe hours become, if a ſmall portion of them only were given to the operations of mind. To learn ſomething of nature and art, or to get ideas which would render converſation, if not improving, at leaſt, intereſting and agreeable: it will be anſwered, that the time, neceſſary for theſe valuable purpoſes, is eaſily commanded, but not the ſtate of mind proper for the uſe of it. Buſineſs exhauſts the ſtrength of animal life; and the cloſe of the day, ſhould be given to that eaſe which will relieve and recover. Few are the individuals, who can thus bewail the demands and effects of buſineſs with any juſtice. However, if their complaint be true, it is an accuſation of themſelves. Did nature ſend them here ſolely to be employed in providing for the ſtomach, or in protecting the ſkin? Did they ever aſk themſelves, whether their probable gains, when ſecured, are ſure enjoyments: or are they certain, that their whole object is not the gratification of very rapacious deſires, in their own characters, and of ſure corruption and wickedneſs to their poſterity?

Have they ever looked to a period, at which they are to ſtop accumulating for the ſake of enjoying; or have they ever conſidered what they would gain, if they gave a little leſs of the prime of life to buſineſs, for the ſake of giving a little more to their intellects and characters? But let us allow the wiſdom of their preference; and that the exhauſtion, conſequent upon their ſage choice of purſuit, is enough to take away all poſſibility of exertion at the cloſe of the day; a queſtion or two ſtill remains to be aſked: How early do they begin in the morning? Is it impoſſible that ſleep ſhould obtrude a little leſs upon their hours of idleneſs; and that a ſmall portion of time might be ſeized, before recovered nature is again chained to the oar, or again plunged into the whirl of anxiety, buſtle and paſſion? Rare is the caſe of him, whoſe neceſſities preclude every poſſibility of this kind. It is that of a ſlavery the moſt deſpicable, if it can be avoided. It is that of a ſlavery the moſt deplorable, if it cannot be avoided; for it proves either the tyranny of paſſion, the moſt profligate, in the individual; or of abuſes the moſt oppreſſive in ſociety.

I have ſaid, that arrogance often appeals to the urgency of buſineſs for the juſtification of ignorance. The conduct of arrogance generally proceeds from high claims to ſuperiority, and is moſt inſolent in its appearance and in its expreſſions, when things we much deſpiſe, come in competition for our preference, with things to which alone we aſcribe value and importance. In the ſcale of men, devoted to property, whatever in quality, or character, or derivation, is diſtinct from its circumſtances, its powers, and its conſequences, is below nothing; and conſequently the object of their antipathy and contempt. Their ſtandard is formed, as it is in every inſtance, by their experience; and as they have no experience of what knowledge is, of what gratifications it cauſes, why ſhould they think highly of knowledge; or, when viewed near that which concentres in itſelf, all they value and deſire; how can they otherwiſe than deſpiſe it? Beſides, knowledge, aſſuming the various characters of ſcience, philoſophy, or art, is often poor; it is cloathed in rags; it is expoſed to the wind and rain, and frequently wants a meal. To a mind, eſtimating nothing but the appearances of wealth, how can theſe appearances be otherwiſe than mean and loathſome? Or when the claims of intellect, fortune and attention, come in oppoſition to thoſe of buſineſs, is not the arrogance that repels the one and prefers the other, though altogether fooliſh, at the ſame time, altogether natural?

I have ſaid, that the language which urges the preſſure of avocation, as a plea for ignorance, is frequently the language of quackery. The appearance of buſtle and extenſive employment is, of all others, the moſt flattering to weak minds: conſequently, when there is no ground for ſuch an appearance, the vain and fooliſh will affect it; or they will aſſume ſome of thoſe external diſtinctions, which are at any man's command, if weak enough to uſe them. How eaſy is it to appear buſy when others are idle. What, but indecency, the moſt vulgar accompliſhment of impudence, is neceſſary to break an engagement, as if ſuddenly called off by ſome weighty concern; or to lament the loſs of all opportunities for improvement, as the conſequence of being altogether oppreſſed by the ſchemes and duties of proſperity? I have known ſome perſons, who have ſquandered away more time on the prate of empirical nonſenſe, than was requiſite to learn a ſcience: and I have known others, who, by ſtudying to be ſingular, by doing things for ever out of ſeaſon, have waſted three times the hours, that ſome of the firſt ſcholars have devoted to their attainments.

The quackery, proceeding from the vanity of property, ſhews itſelf, in many other ways, inimical to knowledge, beſides, that which I have juſt noticed. I queſtion whether there be any one branch of commercial or profeſſional art, for which the peculiar adroitneſs that is neceſſary, may not be acquired in a year, at moſt, circumſtanced even as this part of education is at preſent: but according to the prevailing cuſtom, countenanced by the laws of the land, a portion of five years is the leaſt ſpace of time which is thus devoted. Indeed, a ſmall part of this is employed in learning what is profeſſed to be taught. The chief of it is ſacrificed to ſome low and unimproving drudgery, improved by the intereſt of the maſter, or to the acquiſition of vicious and idle habits from the profligates, with whom they aſſociate. This dreadful ſource of corruption to the public character, and of ignorance to the public mind, is defended by thoſe whoſe profits flow from it, or whoſe vanity is gratified by it, on the ground that there is a ſomething learnt during long ſervitude, which is known only to men of experience. I will acknowledge, that in certain caſes there is ſome force in this obſervation. When the muſcles of the limbs are to be tutored in all the intricacies of movement which ſeveral mechanical parts require, the frequent repetition of long familiarity is requiſite. But even in this caſe, the appropriation of time is moſt commonly enormous. Indeed, there is no inſtance, in which young perſons are not kept in their fetters for months and months after they are perfect in the execution of what they do; beſides, the cuſtom of ſome countries, in this particular, exterminates the pleas of neceſſity held up by others. The Germans are amongſt the moſt dexterous of the Europeans in the uſe of their hands. And no mechanic amongſt them paſſes through a ſervitude of more than two years. It ſhould be added, that the trouble of teaching is what no maſter of a trade, or mechanic art, numbers amongſt his duties. The youth acquires what he learns by ſeeing other workmen; and I have no doubt, that if the wiſdom of teaching, imperfect as it is, was extended from our ſchools to our ſhops and counting houſes, we ſhould ſee evidences more ſtriking, even than what we have, againſt the long and ſtupifying ſervitude which I am reprobating. However, what I have admitted is far from applicable to the cauſes which I have in my eye, and which are by much the moſt numerous. I never yet knew a young merchant who was not either a perfect idler, or a perfect ſlave. If he works, it is amongſt porters or clerks; or he is engaged where his mind acquires little or nothing. He copies letters, he packs up goods, he ſtands gazing on the wharfs, or he does that which requires nothing but muſcular ſtrength, or the moſt vulgar attention of the eyes. If he does not work, he is parading the ſtreet. He is preſent at public ſpectacles of diverſion.

ſion. His time is a burthen to him. He ſeeks for ſomething to intereſt and employ him; and he finds it in bad company. Ignorance, profligacy, and ruin, are the conſequences of ſuch idle ſervitude. But where the ſervitude is that of ſuch labour as I have deſcribed, nothing is learnt of any importance to the future concerns of life: for when its long duration is over, what is eſſential to a man, acting as head of his houſe, is ſtill to be acquired, for the neceſſary experience in this particular ſituation is to be learnt only by an intercourſe, in which vigilance and obſervation are enforced by injuries, immediately felt, and by advantages, immediately enjoyed.

It will be ſaid, that a habit of drudgery is a great thing. If we admit this, we admit little. Are habits of this kind, attainable only by the ſervitude of many years? On the contrary; will not every man, who has ſtudied human nature, allow, that the habits of *months*, well formed, are the habits of life? Beſides, may not theſe be acquired as well in the drudgery, that improves the mind, as in that which tries and wearies the patience, by bringing the body only into action? If I were determined, by what I have obſerved amongſt my own acquaintances, I ſhould fix upon men of literature as ſome of the greateſt drudges; or as thoſe who apply the greateſt number of hours to things little intereſting in themſelves, and ſubmitted to, merely as promiſing to make the future profitable.

There is one effect beneficial to a *mercantile character*, proceeding from long ſervitude, which I will readily acknowledge. The ambition of property is engendered in thoſe circumſtances alone, in which every prejudice and every paſſion is inflamed and eſtabliſhed, by numberleſs aſſociations of ideas, diverging and ramifying from the ſingle idea, that property only is valuable. Moreover the circumſtances of a long ſervitude are neceſſarily of this kind. They admit only of one train of thought. Amidſt their buſtle, the language of trade is alone heard ; the objects of trade are alone ſeen ; the ſucceſſes of trade are the only ſubjects of ſtory, and its loſſes of ſympathy. In ſhort, the mind is violently torn from its natural adheſions, and its energies become dead to every thing but that which enſlaves it. How different would the character be, if, during the ſame time, it had been liberalized and ſublimed by the influence of ſcience and art. Partialities would occupy the mind which nothing could ever extirpate. A taſte would be created for ſuch pleaſure, as would control the groſſer appetites of buſineſs. Reaſon would aſſume a certain degree of authority over ſenſuality ; and the value of its means would ſtand ſome chance of being viewed in compariſon with better things. But let us attend to a queſtion which, with pertinence, occurs here. Do you mean to ſtate, that knowledge and buſineſs are in oppoſition to each other? Do you mean to ſay, that mankind muſt be divided into thoſe who are the wealthy ignorant, and thoſe who are philoſophical paupers. In my opinion, the direct reverſe is true. The education which would make a man moſt wiſe, would enable him to become moſt rich. But that which excludes him from knowledge, excludes him from the moſt eaſy, and ſure road to proſperity. Is not commercial ſkill founded in ſcience? And why ſhould that which gives its whole power to a thing, as a ſyſtem, be injurious to the individuals who form it? Is there any thing in the ſciences, contrary to induſtry, to patience and good temper? Nay, is there not every thing defective and exceſſive to be expected from the buſy paſſions, when ſomething of the character and authority of ſcience is not preſent to control them? I would again aſk, Where is commerce more proſperous than amongſt thoſe, who think cautiouſly and correctly; and who know how to reaſon well, when obſcurity veils their future proceeding? And what individuals are more likely to do this, than thoſe who have been diſciplined in the general rules of inveſtigation and judgment, before they entered upon the particular maxims of trade and buſineſs? Who have proceeded in collecting their knowledge with an habitual regularity and preciſion; and who have not agreeable to the prevailing habits of commercial education, been left to pick up, what prejudice, or chance, or error, may throw in their way.

It will be anſwered, that the faſcinating influence of knowledge will give a diſlike to ſuch dry purſuits as thoſe of buſineſs. This aſſertion will never be admitted by thoſe, who are experienced in the feelings and other effects, of knowledge: for they are fully ſenſible, that to call forth their activity in any inſtance, nothing but a conviction of the concern's being important, is neceſſary. In their intellectual progreſs, they are daily acting upon this principle. They are daily ſubmitting to the moſt irkſome drudgery, upon mere ſpeculation, as to enjoyment. They are, therefore, of all other men, the moſt likely to do it in trade, whenever appearances will juſtify the time or labour which they hazard. I have ſeen the firſt ſcholar in this kingdom altogether occupied, for ſeveral weeks, in comparing the references of an index, with the parts referred to in the correſpondent text. There is nothing in the drudgery of copying, numbering or caſting up; nothing in any action of the hands or legs, repeated for hours, more ſlaviſh than ſuch an action: or than the ſtill more ſtriking employments of ſome literary men, who, for twenty or thirty years together, will ſubmit to all that is tedious and fatiguing, and worrying, in the occupation of a tutor, or a ſchool maſter. It is their hard fate, day after day, to toil, like a horſe in a mill. They go round and round the ſame poſt, and there is nothing ſo intereſting in their progreſs, as the meaſurement of that time which has been worn out ſince the commencement of their labour. I would add, that there is nothing in a trade, an art, or a profeſſion, that has not a ſomething in it highly gratifying to an improved mind. The varieties of neceſſary proceſſes; the anomalies of ſucceſſive effects; the novelty of changes perpetually occurring; the ſuggeſtion of new improvements; and a thouſand other particulars, delightful to the intellectual part of man, will diverſify the career of the ſcientific. They will kindle the ſpirit of enterprize, and will give him an intereſt in buſineſs, which cannot be felt by the ignorant, or by thoſe who have in their minds, no kindred ideas, to be affected by tranſient events and appearances. What I have ſaid to prove, that the demand of buſineſs upon the time of youth, that its encroachment upon the duration of their education, is founded in falſe and empirical pretenſions, or in giving undue importance to things of no ſignificance, but as the means of pride or vanity, might be confirmed by an appeal to experience. What I have ſaid is proved, if thoſe who have cultivated the arts and ſciences will be found to have proſpered in the peculiar purſuits of trade, more than thoſe who have neglected the one, and devoted their whole time to the other. I might here contraſt the hiſtory of Florence with that of Holland. But I will content myſelf with two examples, concerning which, as our knowledge is more perfect, ſo will our deciſions be more eaſy and leſs equivocal. The Cretans were a people who devoted every thing to commerce: infancy, youth, and all the ages of life: laws, cuſtoms, religion and government, one common trading principle, directed and pervaded the whole. They had no arts amongſt them. They had ſuch productions only of the mind, as their money could purchaſe. The ſlaves of property, they thought nothing elſe of importance; and, conſequently, became of no importance themſelves, but as examples to deter the ſober from drunkenneſs, and the temperate from gluttony. It is true, they erected three hundred cities on the ſurface of their iſland; but we hear of no colonies which they ſent forth: no improvements which they invented. They never once glitter in the ſplendid pages of Greek hiſtory. They were the contempt of their contemporaries; and they have left no monuments, no public building, no magnificence of architecture, to convince poſterity that their gains were more than adequate to ſupply their ſtomachs.

The Athenians were a commercial people. They lived on a rock, and muſt have ſtarved, if confined to its productions: but, by the aid of a fine port, and of rich ſilver mines, which ſerved them with ſtaple commodities, they extended their trade and colonies all over the coaſts and iſlands of the Mediterranean ſea. The influx of their commercial wealth, enabled them to conceal the barrenneſs of their ſoil, by ſpreading over it the moſt beautiful city that ever adorned the face of the world. Its ſtatues, its porticos, its temples, its monuments of the dead, its conveniences for the living, its private and public buildings, have been for ages the delight of every improved mind, and the inſtruction of all that is philoſophical in human art. Its poets, orators, hiſtorians, ſages, painters, ſculptors, &c. form a conſtellation which the eye of wonder has been hitherto fixed upon, without a hope of rivalſhip. Their equals muſt be the produce of improvements, rapidly carried on for ſucceſſive centuries. But though trade enriched the Athenians, and furniſhed them with all the means of their greatneſs, yet it was always a ſecondary object, it was cheriſhed as an auxiliary, and not as a leader. Neither their education, nor their manners, nor their laws, nor their religion, was contaminated by its groſs influence. All theſe were entirely directed by ſcience and art, whoſe diſtinctions monopolized all the ſtrength of deſire, all the order of ambition, and all the pretenſions of whatever pride prevailed in the public mind. To be the patron of Phidias or Praxiteles: to enjoy the company and acquaintance of Socrates: to produce a ſtatue, by devoting to it the leiſure hours of a whole life, or to ſpend a fortune, or all the acquired wealth of years, on ſome work of ſkill; theſe were the primary objects that faſcinated the efforts of an Athenian, and conſequently, wealth, as the means of procuring them, ſtimulated the induſtry, neceſſary to its own accumulation.

Solon was induſtrious as a merchant, and became rich. In this capacity he viſited Aſia Minor and Egypt. We know little of what he did as a tradeſman. This was a ſecondary object to himſelf, and conſequently he has not diſcovered it to poſterity. But what he chiefly went forth to ſearch after was knowledge, ſcience and art. He came home, having his mind charged with theſe materials. His countrymen had the wiſdom to perceive the value of what he imported. They readily gave up their prejudices, and their exiſting regulations, for his laws. They, conſequently, became one of the freeſt people, and he the firſt philoſophical legiſlator that ever lived.

The commercial, like every other character, both of nations and individuals, is the creature of circumſtances; and, conſequently, wherever circumſtances reſembled thoſe to which I have juſt alluded, there another Athens would riſe to be the light and example of the world. But an inveſtigation of the powers, prevalent in Athens, diſplay a difference, which ſeparates them moſt widely from the ſelfiſh and ignorant tyrannies of the preſent day. The difference, however, is, in nothing, ſo viſible as in the principles, the method, and objects of our education. The children of the Athenians did not ſpend ten of their firſt years in learning the elements of a language. Their earlieſt ideas were thoſe of things, of their connections, and of their dependencies upon each other. Their earlieſt exerciſes were thoſe of reaſon, and long before the firſt ſeductions of paſſion diſtracted their minds, they began to taſte the deliciouſneſs of ſcience and art; and to realize their youthful and glowing ideas by the uſe of their hands. They were men and philoſophers at ſixteen; and, if they entered upon the ſervitude of any buneſs, they were adequate to it. They were all alive to the enjoyment of their leiſure hours in the academic groves. What a revolution muſt take place in public manners, and public opinion, before the preceding become the circumſtances of our own country! The barbarous trifling, which we call teaching, muſt be thoroughly exterminated. Men of ſcience muſt preſide in our ſchools; and the elements of geometry muſt become the firſt grammar that is taught. The public mind muſt feel itſelf contented with a ſingle vehicle of ideas; and not ſpend the whole of infancy and youth in multiplying means, before we taſte or think of the end to be obtained. If theſe, and many other changes, which I could mention, were to take place, how ſoon would experience convince us, that the age in which man can propagate his ſpecies, and that, in which his mind may be ſufficiently well ſtored and ſtrengthened to teach and ſupport them, are contemporaneous? How ſoon ſhould we learn, that in this, as in all other inſtances, the great Creator has moſt accurately adjuſted the poſſible improvements of our ſeveral capacities: and that if we are, in any caſe, ripe enough for one duty before we are prepared for another, that ought to attend it, the fault is to be found amongſt the blunders of human folly, or the abuſes of human wickedneſs? Difficulties, it is true, of Alpine bulk and texture, ſeparate us from that ſtate of things, in which man will have wiſdom and virtue enough to realize the poſſibilities of happineſs and improvement, which nature has opened to him. Conſequently, thoſe who wiſh to forward the public mind, cannot teach as if that ſtate of things were preſent, or at a moderate diſtance only. They can only recommend ſuch ſteps as promiſe to be moſt advantageous, when viewed near prevailing circumſtances. They muſt addreſs themſelves to minds waſted by the tyranny, the ſtupifying proceſſes, and the blundering negligence of our ſchools: and if, by perſuaſion, they cannot ſhorten the degrading and corrupting ſervitude, which precedes the various entrances of occupation, they muſt act as if the improveable principles of man might outlive ſuch oppreſſion. Indeed, in this direction of their labours, they have more than mere probability to encourage them; for in caſe what I have already ſaid be true, the ſeeds of knowledge, at any period of life, may be ſown ſo as, with due cultivation and care, to grow and flouriſh.

It is hence clear, that in our efforts to enlighten and to inſtruct, we ſhould feel no deſpair about conſequences; but direct our whole anxiety to the wiſdom of our plans. It is, at the ſame time, clear, that whatever our plans are, they muſt, if efficacious to any extent, be alike applicable to all ages. The human mind, whether belonging to an old or a young perſon, if properly trained, muſt go through every part of the proceſs, whoſe beginning ſuppoſes a ſtate of perfect ignorance. "For, unleſs ye become as little children, ye cannot enter into the temple of ſcience."

This is the principle of the plan, which I am now going to explain. It requires no other previous knowledge than that of reading and writing our mother tongue. It admits even the probability, that we may not be able to acquire the elements of geometry. Relying, for its ultimate ſucceſs, on the certainty, that what the mind has once reliſhed it will never relinquiſh, it aſks only the reſolution, the perſeverance and the induſtry of a few weeks. Its ſeveral parts refer to the ſeveral cauſes of permanent ignorance, which I have juſt inveſtigated. It is calculated, rapidly to multiply aſſociations, ſo as to create an intereſt in the purſuit of knowledge, as ſoon as poſſible. No avocations can interrupt its proceſſes, no portion of time can be too ſmall for the diſcipline it impoſes. Whatever the eye is fixed upon, whatever impreſſes the ear, furniſhes it with a beginning. It throws no veil over the ſucceſs of our labours; but it compels us conſtantly to ſee and feel the value of what we gain. Its commencement is with the ſimple proceſs of obſerving, and deſcribing, and with the conſequent neceſſity of collecting and arranging. Its more advanced proceſſes refer to the mind, when, from a view of the treaſures, accumulated by the mere exertion of memory, it begins to apply, to abſtract, to infer abſtruſe relations, to trace out general laws, to be ambitious after great diſcoveries, and to follow the tracks of thoſe who, riſing to the higher regions of philoſophy, ſurvey the œconomy of whole ſyſtems, reduce their outlines within the compaſs of general comprehenſion, and aſſociate the eminence of their own wiſdom in the public mind with that of the wiſdom which pervades the infinitude, governs the unnumbered powers, harmoniſes the endleſs diverſities, and preſides over all the changes of the ſurrounding univerſe.

The ſeveral ſources of knowledge are the following:

1ſt. Circumſtances.

2dly. The powers that act in thoſe circumſtances.

3dly. The means of thoſe powers.

4thly. The changes that take place in the circumſtances, in the powers, and in the means.

That our firſt efforts ſhould be directed to the knowledge of circumſtances is clear, from the certainty that they regulate not only the degree, but the character, of every power, and the means by which it acts together with all their numerous peculiarities of forms, ſtructure, &c.

Suppoſe that I knew nothing more of a camel than what I could learn from ſeeing it in London. The great peculiarities of its nutritive power would no otherwiſe intereſt, than as myſteries or ſtrong ſtimulants to my curioſity. I ſhould aſk, in vain, why it is furniſhed with a fifth ſtomach: or why a vaſt load of fat is placed on its back. But when I learn that it lives on the deſerts of Arabia, where its wants may expoſe it to an abſtinence from water and food for many days, I ſee in the fifth ſtomach, a reſervoir, adequate to the animal's probable neceſſities; and in the fat, a ſupply of nutriment to the ſyſtem, when it cannot be derived from the inteſtines.

Again. Suppoſe that my only knowledge of the Kanguroo was that of ſeeing it in the hands of a ſailor, who caught it near the water's edge in Botany Bay, I ſhould ſurvey its glutæi muſcles, the length, form, and ſtructure of its tail, and many other means of its motive power, with aſtoniſhment; and their peculiarities would be the only influence which would faſten them to my memory. When, however, I gained ſome information of the country; when I learnt that the creature moved on a ſurface, covered with high graſs and high buſhes, over which, if it eſcaped from danger, it muſt bound by ſingle leaps; the circumſtances regulating both the character and degree of its powers, are immediately ſeen; and the viſion of the mind, which previouſly was that of obſcurity and darkneſs, becomes that of day-light and complete preciſion. It is unneceſſary to multiply inſtances, or to produce caſes, equally applicable to all the powers of organized beings with thoſe I have ſpecified, as illuſtrating the nutritive and motive powers. But if we admit, that the knowledge of circumſtances muſt precede that of every thing elſe, I would urge the neceſſity of knowing them as minutely as poſſible. The parts of the ſyſtem that ſurround us are not to be judged of by the common ſtandard of importance, in uſe amongſt human beings.

You are not to meaſure their extent of activity by what the vulgar eye would neglect, as trifling diverſities of magnitude, weight, form and colour. Numerous are the caſes, in which the welfare of myriads has turned upon a hinge, ſo inſignificant in appearance, as to eſcape the obſervation of whole centuries. I mention theſe things under a conviction, that minuteneſs of detail and deſcription requires eaſe and pains; and that the reſolution, neceſſary to exerciſe theſe requeſts, is by nothing ſo much enfeebled, as by that blindneſs which hides the application of our knowledge. I would, therefore, repeatedly urge the importance of aſſuring yourſelves, that ſome time or other every idea we treaſure up will be of uſe; and that, probably, the very next inſtant we may not only feel its intrinſic value, but aſcribe to it the value of many other acquiſitions. In the preſent inſtance, however, as in every other, where perſevering attention is neceſſary, the ſpirit of our progreſs will depend much on the method we purſue. We may plunge our minds into a contemplation of circumſtances, as into that of a chaos. We may, on the other hand, follow inveſtigation and arrangement, the very order purſued by nature itſelf, when ſhe firſt combined them. The difference between theſe two caſes is almoſt infinite. I do not mean to ſay, that what I am going to ſtate is the natural order of external circumſtances. It is an arrangement, deduced from the order obſerved by nature, in a great variety of other caſes. The human ſyſtem is a complex infinitude of parts, but its outline is ſimple and definite. In learning this ſyſtem, we begin by marking out that outline. We then divide it into grand parts, and trace the outline of theſe; we ſubdivide them again into grand parts, and go on with the ſubdiviſion, till we ſeparate the whole in the order in which it was firſt connected by him, who firſt deſigned, and then created it.

For the ſake of perſpicuity, let us here be more ſpecific. The human ſyſtem is a combination of forms, relative ſituations, and poſitions, dimenſions, textures, colours, &c. This is the moſt general view of it. This is the view, in which its properties participate with thoſe of all other ſyſtems. Again. The human is a ſyſtem of arteries, veins, abſorbents, membranes, bones, muſcles, &c. But each of theſe grand parts is a combination of forms, relative ſituations, &c. Again. The human is a ſyſtem, formed of the head, the trunk, the arms, legs, &c. Each of theſe parts has its forms, ſituations, &c. Each of theſe has its arteries, veins, &c. And each of its arteries, veins, &c. has its forms, &c. In the preceding caſes, the arrangement is perfect, in proportion to the ſucceſs, with which we place, among our firſt order of parts, things of the moſt general character; and then deſcend to things of a leſs general character.

The ſyſtem of external things, like that of the human body, is a ſyſtem of forms, ſituations, &c. Its grand parts are, air, earth, and water, and to each of them, as a whole, ſome, or moſt, of the general properties already mentioned, belong. The air, again, has its grand parts: there are rains, dews, electric fluids, &c. and each of theſe its general properties. The water is a ſyſtem of things, having forms, ſituations, &c. and its grand parts, which are ſeas, rivers, fountains, &c. have their general properties.

The earth, or dry land, like the other grand parts of the external univerſe may be conſidered as a ſyſtem of forms, &c. Its firſt order of ſubordinate parts may be divided into mountains, valleys and plains, each of theſe may be ſubdivided, as conſiſting of minerals, animals, vegetables, and human beings, with all their ſubordinate diviſions.

The method, applicable to the arrangement of circumſtances, is equally ſo to that of powers. Thoſe, belonging to life, are diviſible into two kinds. The powers of individuals, and the gregarious, or ſocial powers.

The powers of individuals may be claſſed in the order of their action.

Firſt, The nutritive power. Its grand parts are the ſeveral proceſſes, by which its ends are effected: ſuch are, purſuit, preparation, deglutition, maſtication, digeſtion, abſorption, circulation and evacuation.

Secondly, The propagating power. Its grand parts are ſeveral proceſſes, by which its ends are effected. Such are, copulation, pregnancy, geſtation, rearing. The other powers of individuals are the motive power. That of ſenſe, paſſion, intellect, and language; their grand parts, or proceſſes, are ſpecified in the table for which theſe directions are intended.

The grand parts, to which each of the proceſſes is confined, are the means employed by them: there are parts, which may belong to all the means, and theſe ſhould be claſſed as a more general order.

There are parts, which belong to each, and ſhould be claſſed by themſelves, as a leſs general order. This is done in the table. Thus, arteries, veins, &c. belong to every part of the ſyſtem; but the ſtomach, penis, legs, eyes, ears, tongue, belong to diſtinct powers: but each of them has arteries, veins, &c.

The ſocial, or gregarious powers are chiefly confined to man. The firſt of them is education. Its proceſſes are thoſe of teaching the mind, improving the body, ſorming the character. The other powers are religion, government, laws, commerce, polite arts, domeſtic arts, military arts, ſciences. Each of them are ſubdivided into proceſſes; and theſe are marked in the table.

In the means of the preceding powers, there are very few of general relation. They ſhould, however, be placed together in the table; and the chief arrangement which can help enquiry concerning them, is that of putting thoſe means firſt which belong to the powers firſt ſpecified; and ſo on. What I have ſaid concerning ſocial and individual powers, renders it unneceſſary that I ſhould amplify on what I call general powers, or thoſe, whoſe influence extends to all the objects of time. They have no means peculiar to their action; but they have diſtinct modes of action; and theſe are ſpecified in the table. Thus the words, gravity, heat, light, &c. expreſs the general powers: and the words, attracting, repelling, &c. expreſs their ſeveral modes of action. Having now given you an outline of the diviſion and ſubdiviſion, which ought to be uppermoſt in the mind, when you are ſearching for information; it will be proper next to deſcribe the mode of applying it.

The opportunities of knowledge are of two kinds:

1ſt. Thoſe offered to your own obſervation.

2dly. Thoſe offered by the obſervation and inſtruction of others.

When you employ your own obſervation, it will be wiſe always, to fix your firſt attention on things in action; for they are tranſient, and if not inſtantaneouſly caught, the knowledge, they may give, will be loſt. If the action be that of an animal, you ſhould begin with fixing upon the power he is exerting. When you have done this, you will queſtion it upon each of the words, ſpecified under general properties. You will then proceed to examine the means it employs; and each of theſe you will ſubject to the ſame queſtions as you did the general power.

Take the following as a ſpecimen, in which the mind of the obſerver proceeded, agreeably to the arrangement I have juſt mentioned.

" The moon-light darted through the trees into an open receſs in the woods, which was ſurrounded by buſhes and thickets moſt cloſely interwoven, when I ſaw a lioneſs crawling with her belly touching the ground, and with her head turned backwards. She, at the ſame time, rubbed her ſkin againſt the graſs, and growled with a catterwauling ſound; preſently, from an oppoſite buſh, advanced a lion giving out a ſimilar ſound. He and the lioneſs, ſeveral times after they had approached a ſtep or two, ſtood looking at each other, and ſeemingly contending which ſhould make the greateſt noiſe. This dalliance continued ſometime, before the lion mounted on the female's back. While in the act of generation, I preſented my muſket, I fired. The ball entered the lion's heart; he dropped. The female diſengaged herſelf, and eſcaped. When the day light appeared, I diſſected the genitals, and their relative parts." The author now goes on to deſcribe the dimenſions, form, ſtructure, &c. of the penis. He then goes on to its blood veſſels; their form, ſtructure, &c. He then goes on to the veins; their form, &c. He then goes on to the integuments; their form, &c. After he has finiſhed the penis, he proceeds, with equal regularity, to the ſeveral veſſels, &c. The example I have choſen is that, in which the propagating power is in action. Its poſture, ſound, and the duration of its dalliance are the general properties. The means of the propagating power are then choſen for diſſection: for the peculiarities of action point them out, as in a peculiar ſituation. I need not obſerve how their grand parts and the diviſions of thoſe are ſucceſſively and regularly examined.

Let us next ſelect one of the ſocial powers as a ſpecimen. "At this time the government was exerting the utmoſt plenitude of its energies. Its agents were in motion, from the metropolis to the remoteſt frontiers. Its concerns put a ſtop to every other concern; to that of education, trade, agriculture, ſcience, &c. Its terrors were thoſe alone, which intereſted the fears of individuals. Its meaſures were the only objects, which occupied the

public

public expectation. If you ſaw women whiſpering, it was about their governors. If you ſaw a thoughtful man ſighing, or ſhrugging up his ſhoulder, he was either in aſtoniſhment or dread, about the reigning adminiſtration.

The ſoldiery paraded the public places, ſtopped the current of common occupation, and interrupted all the habits of general convenience. Not a paſſenger could move along without being incommoded. Not a ſtrange appearance could eſcape arreſt and examination.

The ſoldiery were, moreover, poſted at all the avenues into the town: at the treaſury, at the palace, and all the public buildings. They employed crowds, in ſtrengthening the fortifications of the citadel; and horſes and labourers were in requiſition, for the purpoſe of conveying ſtores of ammunition and arms to the different poſts.

At the ſame time, ſpies and informers, without number, prowled in all places of public reſort, and haunted the ſteps and rendezvous of all popular individuals and ſocieties.

The partizans of government were, likewiſe, employed in their ſeveral diſtricts. They formed aſſociations, they awed their dependants, bullied the doubtful, threatened the daring, and contrived to alarm the timid, by ſtories of plots, and by advertiſements, publiſhing the moſt enormous conſpiracies, and offering vaſt rewards, for the detection of delinquents.

The nobles compelled their tenants to aſſemble, and to commit themſelves, by profeſſions of loyal determination, and by declarations of the moſt loyal ſentiments. They inſiſted on the rigour of their ſeverity towards thoſe tenants, who betrayed any marks of ſedition; and towards thoſe public houſes, in which any ſuſpicious meetings were held.

Men of landed property, were buſy in a ſimilar manner, but in an inferior degree.

The clergy preached nothing but loyalty. They made it the object of their devotion; and with every influence, derived from the holineſs of their character, from their temporal and celeſtial authority, from their claimed diſpoſal of future puniſhments, and from their denunciation of God's immediate judgments, they urged it to their flocks. They, at the ſame time, burthened the preſs with loyal publications; and in all meetings, encouraged by government, they were the firſt movers, the moſt oppreſſive and violent in ſpeaking, and the moſt eager in acting, either as ſecretaries, or committee-men. There was no one party, which paſſed from houſe to houſe for ſignatures, in which a clergyman did not, either attend, or take the lead. They loaded the public ear with cant expreſſions of loyal fanaticiſm, and in their public ſervices, ſuch was their fidelity, ſuch their idolatry, to the reigning adminiſtration, that an atheiſt, if loyal, might have joined in them, without offending his principles. But while the rulers were thus buſied in the employment of their ſoldiers, their dependants, their partizans, their aſſociates, the nobles, and their creatures the clergy, they were equally active in dividing the parties that oppoſed them. They bought the venal; they flattered the vain; they beſet the violent with the importunities of their connexions. In many inſtances they intrigued ſecretly, in others publicly. They were inexorable in puniſhing delinquents, and boundleſs in their prodigality to the abandoned and perfidious.

The preſs was at the ſame time an engine in their hands. They deluged the country with ſmall publications of falſehood and calumny. No writer was too mean for a large bribe, if he wrote in their ſervice; and no character too contemptible to be employed as an advocate in their cauſe. Enormous were the ſums they ſpent amongſt the editors of news papers; and the publiſhers of magazines and reviews were encouraged to court their patronage, by the abuſe of reaſon and philoſophy, if, in any caſe, it bore the aſpect of democracy. The preſs, however, was a trifling engine, compared with the judiciary part of government. The judges, in their addreſſes to the grand juries of the ſeveral counties, expreſſed themſelves only in the language of alarm, againſt intended plots, or of abhorrence, againſt the tenets and practices of the ſeditious. They called upon the juries for aſſiſtance, and reaſoned, as if juſtice were to alter her conduct with the complexion of the times.

The advocates, who pleaded againſt the ſeditious, were inſolent and violent, beyond all example. They regarded no decency, in the characters of their witneſſes; they felt no ſhame, at the production of the ſpies and informers of government, to ſupport the cauſe of government. In many inſtances, the loyal were detected in perjuries of the groſſeſt kind: and, in one inſtance, a moſt profligate reprobate was pardoned of a capital crime, that he might be legalized and qualified by the king's mercy, to become a witneſs in a trial for treaſon. Many of the barriſters, who triumphed over all decorum, were raiſed to be judges; and thoſe whoſe humanity interceded for the oppreſſed, were turned out of employment, bullied with menaces, and oppreſſed by calumnies. The greateſt pains, the moſt artful intrigues, were employed in the formation of juries. Gentlemen of large fortunes, ſtrong prejudices, and arbitrary principles, were ſelected for finding the bills; and the liſt of ſpecial juries was crowded with partizans, and perſons who held employments under government. The buſieſt enquiry preceded the empannelling, ſo that all diſputes might be challenged: and none, whoſe opinions, or even remote connections, juſtified a ſuſpicion of their diſloyalty, might be concerned in the verdict.

When the management of the juries ſucceeded, then the diſcretion of the judges diſdained all moderation. Every puniſhment was the extreme allowed by the law. The wretched creatures, who ſtrained and perverted all juſtice, inſulted the miſeries of the convict, by adding the moſt inſolent reprehenſion and abuſe to the dreadful ſentence, which confined them in gaols for years, or tranſported them to a foreign country!"

The author here proceeds to ſhow, how the influence of government was employed, not only in the exerciſe of the means it already poſſeſſed, but in the creation of others, ſtill more powerful.

You will here readily perceive the arrangement he has followed. Having fixed upon a ſocial power, in a time of ſingular activity, he begins with collecting whatever facts referred to that power. He then ſeparates thoſe which anſwer ſome of the queſtions, ſuggeſted by the index of general properties; particularly thoſe which refer to the extent of the power. He then claſſes them, as they belong to the ſeveral means of the power: ſuch as the military, clergy, partizans, nobles, &c.

But it is unneceſſary to amplify. I might have ſelected inſtances, illuſtrative of every individual, and every ſocial power. But this would not be leſs burdenſome to you than to myſelf, if you have already directed and purſued the chain of enquiry, which I have endeavoured to mark out. When your obſervation is not claimed, or invited, by things in action, you will then do well to fix your attention upon things inert, or without life. The knowledge of the atmoſphere is the firſt; but that is attainable only by thoſe, whoſe reſidence is fixed on any ſpot. A barometrical and thermometrical diary ſhould be kept; and in doing this, your rule ſhould be to take your obſervations at the time, in which changes are moſt likely to take place; ſuch as ſun riſe, or the commencement of heat; noon, the maximum of it; ſun ſet, the decline of it; and midnight, the minimum. A ſudden change of the wind ſhould lead you to obſerve: or a ſudden change in the appearance of the clouds and ſky. To the preceding ſhould be added the information of a good pluviometer and anemometer, and the thing will be ſtill more perfect, if the diary be enriched by the expreſſions of a good inſulated conductor.

Let us ſuppoſe the waters to be the next grand part you attend to: if your ſituation ſhould enable you, moſt conveniently, to examine the fountains; by traverſing with your eye, over the general index, you will be led to obſerve their ſituation, their number, their quantity, their proximities, their courſe, &c. In caſe the rivers ſhould ſucceed to your notice; the index will direct you to examine their velocity, their beginning, their dimenſions, their courſe, their changes, &c. You will then proceed, in like manner,

ner, to the lakes, and whatever ſeas may either interſect, or waſh, the boundaries of the country. In the following deſcription of Glamorganſhire, you will ſee the exact progreſs of the mind, in the examination which I am now recommending. "The outline of this county is formed, on the ſouth ſide, by the Briſtol channel; on the eaſt ſide, by the fens of Monmouthſhire; on the north, by a chain of mountains, which incurvate themſelves almoſt into the ſegment of a circle. From Romney river to the Lougher is the tranſverſe diameter of the county, or the eaſtern and weſtern extent of it, which meaſures fifty miles. The northern and ſouthern extent is from the mountains of Brecknockſhire to the Channel, and varies from twenty to thirty miles.

By a diary of the barometer it appears, that its greateſt riſe for ſo many years, was

The moſt ſudden changes were in the months

The greateſt cold, obſervable by the Thermometer, took place in

The greateſt heat, in

The common difference of day and night, in winter, is

The common difference of ſummer, is

In ſome part of the country, the temperature is ſo even and mild, that myrtles grow wild.

The moſt common winds are from the S. W. which are laden with rain, and which, by the pluviometer, depoſit every year. The heavieſt rains fall in the months of October and November. The wheat harveſt, in the ſouthern parts, takes place in the latter end of Auguſt. In the mountains, they reap ſo late as the end of September. But this circumſtance varies with the ſeaſons. The whole range of hills which bound the county, ooze out moiſture at all their pores; which when collected into rivulets, and confined by high grounds, form large and extenſive bogs: moſt commonly, however, they unite into rivers. In the plain parts of the county there are ſeveral large fountains, which burſt out of the earth in a torrent, not leſs than that of a common river. There is one of this kind at a village, within one mile of the ſea, which takes its name from the river that paſſes through it.

There are eight diſtinct rivers, which fall, at different places, into the ſea. The direction of all is from the north to the ſouth. They are collected in the neighbouring mountains; whence they bear down, with a very rapid courſe, till they reach the plains. Six of theſe retain their velocity, in a great degree, after they penetrate the low grounds. The ſtream that paſſes through Cowbridge, and the other that paſſes through Euenny, follow nearly the whole of their courſe through a marſhy ſoil. The length of the rivers, in this county, is generally ſhort. The courſe of the Taff, which is the longeſt, is not more than thirty miles. There are ſeveral that do not exceed ten. They never carry much water, excepting after the thunder ſtorms of ſummer, or during the heavy rains of winter. A drought of a month will ſo far exhauſt moſt of them, that you may walk dry-ſhod acroſs their beds. They are ſeldom more than fifty yards broad, and in depth, they never exceed the height of ſix feet, excepting at the excavations, which take place where the courſe of the river is ſuddenly changed. When flooded, their colour is remarkably turbid. Juſt after the flood is over, they have a ſtrong chalybeate colour, ariſing from the vaſt quantities of ferruginous earth, which forms the ſoil of the country. When low, they are perfectly tranſparent; they paſs too rapidly to be much impregnated with ſoluble ingredients. They are, therefore, all of them ſoft waters.

In Glamorganſhire there is but one lake, and that is called Kenfigg Pool. It is about four miles in circumference. Its waters are clear. It lies within ſome hundreds of yards of the Briſtol Channel, and is ſurrounded with ſands. The fabulous diſpoſition of the vulgar aſcribes to it an enormous depth, and repreſents its bottom as covered by the ruins of an old town, which was ſwallowed up by an earthquake. There are few ſtanding waters in this country. On a common, near Lantrythud, which is rather flat, there are four or five, but they are not fifty yards over.

The Briſtol Channel is very wide at the weſtern corner of this county. Though the grounds are high, the oppoſite ſhores of Devonſhire are not ſeen from Mumble Point. About the middle of the county, the Briſtol Channel is about twenty-two miles wide. At Cardiff, it is about fifteen. The waters are poured out of the Atlantic, eſpecially when aided by weſterly winds, with vaſt rapidity. Its ebb tides riſe to twenty or thirty feet, in ſome of the rivers. But they are much varied by the openneſs or confinement of different ſituations. At Swanzea, a ſpring tide will ſometimes riſe to thirty feet.—But the high grounds confine the tide to about five miles, from the mouth. At Briton Ferry, the riſe is pretty nearly equal, but it runs up the valley of Neath river about ten or twelve miles. At Aberravon, the riſe of the tide and the ſurf, together, near the mouth of the river, is very dangerous to ſhipping.—The ſtream, however, is not ſalt at the diſtance of two miles from the ſea.—Pyle river does not ſwell, at the diſtance of five hundred yards from its mouth ; and the tide of the Oginore reaches only to Merthyrmawr, which is not quite two miles from the ſhore. Cardiff arreſts the tide of the Taff. But in the mouths of all theſe rivers, there is a tremendous bar, formed by the depoſitions of what the ſtreams, during the floods, bring down from the mountains, added to that, made by the ſtagnation of the Channel, which is exceedingly turbid.

The ſhores, forming the Briſtol Channel, are much diverſified. From Swanzea, to a point, near Newton, including a diſtance of about twelve miles, they are bounded by a low ſandy flat; and the ſea waters are, for the moſt part, dammed up by a ridge of ſandy hillocks. The protruding point of rocks which interrupt this ſandy boundary, is the continuation of a mountainous ridge, which riſes towards Newton Downs; and there, with ſome little undulation, ſwells into the higher grounds of Kevan Cribbwr. Again the ſhore becomes ſandy, and continues ſo to the mouth of the Ogmore, where a chain of precipices commences and continues near ten miles. Soon after their termination, the flats begin, which continue to the fens of Monmouthſhire.

We might now proceed to the next grand part, and that is the land; and we might here again, by the aid of the arrangement in the index, proceed with the ſame eaſe and clearneſs of method. The wants of man, however, will not allow him, perſonally to make his obſervation into every part of the ſurrounding univerſe. For a great part of his knowledge, he muſt have recourſe to the information of others; or he muſt collect his materials from the reading of travels, natural hiſtory, voyages, &c. But here he will not find the taſk of collecting, with order, ſo eaſy as when he looks into the world with his own eyes. The repreſentations of writers are, generally, a chaos, formed of imperfect, or inſulated parts, thrown together without any regard, either to natural, or arbitrary connections. They are likewiſe, moſt frequently, a mixture of heterogenious ſubjects moſt ſtrangely blended; of circumſtances, thrown out, ſometimes, in a mutilated ſtate; at other times, ſo indiſtinctly and looſely, that no uſe can be made of them. At preſent, moreover, it is the rage of writers to bring the few facts they have to detail, in an ocean of obſervations and conjectures. The method I adopt, in this caſe, is the following: I read the book over carefully, and mark every paſſage that ſtrikes me, with a black lead pencil. After I have finiſhed the book, I read over a ſecond time the marked paſſages, and write, oppoſite to them, the letters which in the table correſpond to the grand parts, or leading heads of the ſubject which diſtinguiſhes the paſſage. After I have done, I put ſlips of paper in all the pages, referring to any one particular topic, and then compare them all together. I thus bring them into a narrow compaſs, and am enabled to methodiſe them according to my own arrangement.

I will here ſelect, as a ſpecimen, Strabo's account of Great Britain.

" Britain has a triangular form, (here follows a compariſon of its width with that of Gaul). There are four paſſages, frequented by thoſe who frequent this iſland. One from the Rhine, a ſecond from the Seine, a third from the Garonne, and a fourth from the Loire. Thoſe who go from the parts near the Rhine, do not ſail out of the river's mouth, but from the country of the Morini, who are borderers upon the Minapii; near this part is Itium, which Cæſar uſed as a ſtation, when he paſſed over to Britain. He raiſed his anchors in the night. He reached the iſland on the fourth hour of the next day; having traverſed, in this time, four hundred and twenty ſtadia. The corn was yet on the ground. The iſland is a plain, woody country. There are many hills in it. It produces corn, cattle, gold, ſilver, and iron. Theſe articles are exported to the continent, together with ſkins, ſlaves, and dogs, well trained for hunting, which dogs are uſed, by the Gauls, as well as the natives, for war. The inhabitants are ſtouter than the Gauls. Their hair is not ſo yellow, as that of the Gauls. Their bodies are looſer. I have ſeen ſome of the youths in Rome, who have exceeded our talleſt men by half a foot; they are deformed in the feet, and very clumſily made. Their manners reſemble thoſe of the Celts; but they are more ſimple and more barbarous. Though abounding with milk, ſome of them are ſo ignorant, as not to be able to make cheeſe. They are ſtrangers to the ſkill of gardening, and to the other ſimple arts of agriculture. There are governments amongſt them. In war they uſe chariots; as ſome of the Celts do. Groves are their cities. They dwell in circular openings, which they ſurround with fallen trees. Here they erect their huts, and ſhelter their herds. " Their atmoſphere is more remarkable for rains than ſnows. It is for the moſt part of the time clouded. So that they ſee the ſun during three or four hours only, at noon".

Nothing can be more chaotic than the preceding account. The deſcription of the boundaries is followed by that of the ſoil, and its produce; from which he paſſes to that of the perſons of the inhabitants, to their diſpoſitions, and next to their ignorance. He deſcribes their houſes, and ſtops to obſerve, that they have many governments. Here he juſt takes notice of the atmoſphere, and then ends his deſcription. Strabo here puts me in mind of a man, who, in deſcribing the human body, would begin with ſaying, that he was wideſt acroſs the ſhoulders; and nearly as wide as the cheſt of an ox, or a horſe; who would then proceed to the quantity of hair, which, he is contented with ſaying, is very conſiderable; who would next number the fingers; and immediately leave the reader to form his own ideas of the remainder, from the few unconnected things, which he had ſaid. Were I to apply the order of the index to the miſerable mixture, jumbled out by Strabo, all I could collect would be thus arranged:

I. Air, remarkable for rain, but not for ſnow ſtorms.

II. Land, ſoil, open and plain. A few hills.

III. Inhabitants, tall, wide, and clumſy; but not cloſely jointed.

IV. Gold, ſilver, iron.

V. Well trained dogs.

IX. 45. Habitations, in open receſſes of the woods, ſurrounded by fallen trees, into which they collected their herds as well as themſelves.

VIII. 403. Knowledge, very deficient. Ignorant of gardening, and the art of making cheeſe. They, however, ride in chariots of war, and are fond of ivory bits, &c.

Obſerve now, that if I have other paſſages, collected from other authors, the little I have ſelected from Strabo, may ſerve to fill up ſome of their deficiencies.

Having marked out the proper arrangement of your ſteps, in the purſuit of your ideas; I will now proceed to the other ends which the table is deſigned to anſwer.

Firſt, Impreſſions of the mind are tranſient things; and unleſs frequently repeated, are ſoon forgotten. But alas! what a toil is repetition, if the obſerver can make it only by familiarizing his eye to the ſame ſcene, or by numerous peruſals of the ſame voluminous maſſes, in which the ſtores of knowledge are buried. Indeed, on theſe conditions, life would be almoſt conſumed in giving permanence to a few only of its poſſible acquiſitions.

In the table to each general head is appropriated a diſtinct mark. The ſame is done to each ſubordinate head, and to the ſeveral general properties. Theſe characters, form a kind of ſhort hand, by which you are enabled to place before your eye, in brief compaſs, a view of all that your paſt labours have accumulated on any particular ſubject, or reſpecting any particular country or place. If, moreover, the appearances, formed by the marks, are not ſtrong enough to revive paſt images on your memory, they will refer you, without trouble, to thoſe pages of your common place book, in which they are recorded. Thus let us ſuppoſe that a book be ſet apart, in which you ſet down all you have heard, or all you have ſeen or read, concerning France. The three laſt pages ſhould be devoted to references. They ſhould, for this purpoſe, be partitioned in the following manner.

In the firſt column, you muſt inſert the ſecondary names, or the name of parts; while the name of the whole is ſpecified, on the back of the book. Thus, you may have ſomething to ſay, concerning a city or town in a whole kingdom. The name of the city is then ſpecified in the firſt column.

In the ſecond column you place the letters expreſſive of the powers or circumſtance, to which the fact you quote, or detail, refers. But that you may be able, when you take a general ſurvey, or review, of what you have done, to ſelect from either of the four great general heads, without ranſacking the whole, four black lines are placed next to the ſecond column. The firſt of theſe is appropriated to circumſtances. The ſecond, to individual powers. The third, to ſocial powers; and the fourth, to general powers, ſo that aſteriſks, made upon them, will ſhew to which of the fourth great heads, the article oppoſite the aſteriſk, refers.

EXAMPLE I.

Paris is written in the column of the Index, belonging to a book, which you ſet apart, as a depoſit of all you have collected, concerning France. VII. 58, expreſſes the number of the inhabitants; and the aſteriſk's ſituation on the firſt line, ſhews, that the oppoſite article is a circumſtance.

EXAMPLE II.

Paris is written in the firſt column. ♈. 69, in the ſecond, expreſſes the law of the living principle in Paris. The aſteriſk, on the ſecond line, refers the article to individual powers. The column, next to the black lines, refers to the page of the book, in which the fact is found, or in which you may learn ſomething, concerning the inhabitants or the law of the living principle, in Paris.

Paris.	VII. 58.	†	12
Ditto	♈. 69.	*	12

By the aid of the preceding index, you may know in a few ſeconds, whether you have ever read or collected any thing on any particular ſubject. You may be informed, likewiſe, of the quantity; and if your recollection is not revivified by ſuch aſſociations as attend the marks, you may turn to the referred page. Many are the occaſions which will ſtimulate you to do this; the want of facts, in particular converſations; or a litigious appeal to facts in debate; or want of proof in ſupport of ſome favourite principle; or a violation of truth, by thoſe who have an intereſt in error. In theſe caſes, experience only can properly eſtimate the advantages of fixing the eye immediately on a condenſation of all that the mind has collected on a particular ſubject. I would add, that under the ſtimulus of the neceſſities, I refer to, we generally attend, with increaſed eagerneſs, to all thoſe qualities and appearances, which give impreſſions their greateſt permanence.

Secondly, An index of this kind prevents a great deal of ſuperfluous toil. When you have read and marked a new book, you are able, immediately, to examine whether you have before made the ſame marks. You immediately bring the parts they refer to into compariſon; ſo that the trouble of collecting, is thus reduced to that of gathering ſuch circumſtances from the one as are omitted by the other.

I would obſerve, that this compariſon is another ſpecies of repetition, moſt favourable to the deepening of impreſſions, already made.

Thirdly, This index creates an intereſt moſt powerful in urging us forward. It operates upon the mind, juſt as a diſplay of his gold does upon the paſſions of the miſer. Our love of what we have is increaſed by the ſight of its magnitude, and as our love is inflamed, ſo do our deſires pant after new accumulations.

Fourthly, The index provides us with a copious ſource of amuſement, which is of all others the moſt conducive to the improvement of our intellects. There is no reading ſo delightful as that of things collected by ourſelves. I never yet ſaw a man who, after beginning an extract, or a compoſition, which is the fruit of his own labours, that could ſtop before he came to an end.

Fifthly, There is nothing ſo delightful as the filling up of a ſyſtem, or the reduction of diſorder, into harmony and method, or, in ſhort, generalizing the ſtores of your mind. The preceding index, or table, is formed with this view. It directs you to fix every idea you collect, in a ſituation, for which ſome reaſon can be given. It attempts, at leaſt, a certain adaptation of parts to their appropriate whole; and, when this is accompliſhed, even imperfectly, a feeling of approbation, attended by a great degree of pleaſure, is produced. Indeed, ſuch a pleaſure, as muſt ſerve, very much, to ſtimulate us in the progreſs of our improvements. Of all the enjoyments, however, attending the poſſeſſion of knowledge, that of the uſe of it, is the moſt exquiſite.

But though the man, who collects well, is that man alone, who can apply well, ſtill, there is a wide difference between collection and application. In the order of intellectual acquiſition, to charge the memory at all, is the firſt attainment; to charge it with method, or with ſuch a harmony and ſympathy of diſpoſition, as to facilitate the readineſs of appeal and reference, is the next thing. But at the head of all is to be placed the philoſophy, or the right uſe, of our attainments. It is enjoyed by thoſe only, who have attended to the preceding particulars. And yet it is not their neceſſary accompliſhment. Many a man of learning is ſtrangely feeble and abſurd, when he tries to develope the deſigns of nature, or to inveſtigate the connexion of cauſes and effects. The moſt childiſh ſuperſtition, the extravagance of fanaticiſm, the moſt perverſe, headſtrong and dark prejudices, often reſide in the ſame mind with much knowledge. But this is not the caſe with philoſophy. The art of comparing; the comprehenſive talent, that brings into one view appearances of the ſame character, though diſcordant and irregular in many reſpects; the caution that is neceſſary to take many views of the ſame object, and to bring many different things into one compariſon; the art of doing this wiſely and well, is obtained only by long exerciſe and care; and by a peculiar degree of ſuſceptibility and jealouſy, with regard to our own errors and miſtakes. The memory, however, is apt to retain, even the peculiar inſtructions of peculiar exertions, imperfectly; and there is in man a moſt ſtrong propenſity to forget his own blunders, and the various uſeful leſſons which may be derived from them.

The index is intended to guard againſt theſe defects, it records the progreſs of our minds, it does not allow the images of paſt errors to be eraſed; but is continually bringing them forward, to remind us of our fallibility, long after their deformity is diſplayed by the new light of new circumſtances and facts: beſides, it enables us to treaſure up the philoſophy we learn from others, and with a ſimilar eaſe and frequency of recurrence, to ſurvey it over and over at our own leiſure.

There is ſcarcely an object, or influence in nature, that does not, in its turn, act as an extenſive and powerful cauſe.

The moſt general cauſes are, 1ſt. Thoſe leading parts which I have arranged under the heads of circumſtances. 2dly. Each of the ſocial powers, which I have enumerated. 3dly. Each of the individual powers.

I therefore ſet aſide a book, firſt to the philoſophy of circumſtances; and, in like manner, a book to each diſtinct individual and ſocial power. At the end of each book I have two or three pages, ruled in the following manner:

		Page.
I a	IX 4ε—	ε3.
c 304.	A 115.	93.
69. cE	χE—	102.
561 θ	Engliſh	84.

If any of the general properties belong to a cauſe that is particularly active, I put the figure that is appropriate to it, before the letter, expreſſive of the thing that is the cauſe. In like manner; if any of the general properties belong to the effect, and are concerned in it, I place them before the mark, expreſſive of the effect.

EXAMPLE.

“ The dimenſions of the animal ſyſtem depend upon the quantity of ſecretion, formed by the exhalants.

halants. The action of the exhalants depends upon the temperature of the air; whoſe two debilitating extremes are, very great cold, and very great heat. When the cold is great, the orifices of the veſſels are contracted, ſo as to require unuſual energy, before they can be opened, and conſequently yield the common quantity of ſecretion. This uncommon energy is rarely exerted; and the neceſſary conſequence is a diminution, or defect, that extends to the general ſize. If the energy be exerted, the ſyſtem requires ſuch ſupplies, and ſuch habitual regularity of movement, as is rarely found in thoſe regions where the cold, by producing a Plethora, produces a general diſpoſition to reſt and inactivity.

If the temperature be that of great heat, the extremities of the exhalants are relaxed; and the diſcharge is too copious for the ſyſtem. We conſequently find, that the perſon of the human being diſplays its moſt ſtriking texture and magnitude, in thoſe temperate climes, where the contraſt of ſize is not more oppoſite to the ſhrivelled, debilitated frame of the Gentoo, than it is to the frozen bodies of the Norwegian and Greenlander."

Here the operating cauſe, is the temperature of the air, expreſſed in the table by Ia. The effect is, the dimenſions of the perſon expreſſed by IX. 41. I therefore record it in the manner, which you ſee exemplified, in the preceding index.

In caſe the connexion, ſuppoſed or diſcovered by the philoſopher, is that of deſign and purpoſe, in the index I place the figures or letters, expreſſive of the peculiarity, before the figures expreſſive of deſign; after the whole, I place the figures, or letters, expreſſive of the end. Thus;

There is a diſtance, at which the diſtinctneſs of viſion is loſt; or if it were not loſt, would be uſeleſs, becauſe its report could not be followed by the neceſſary quickneſs of action in the parts to be guided by it. The eyelaſhes are placed ſo that by their ſenſibility they may give the requiſite alarm within this diſtance, and ſo that the eyelids cloſing inſtantaneouſly may protect the eye. There $\overset{\cdots}{C}$ expreſſes the peculiar part. $\overset{\cdots}{C}$ 304 expreſſes the deſign of the particular part. $\overset{\cdots}{A}$ 115 expreſſes the purpoſe anſwered, or the ſafety of the eyes. The whole is ſhortly expreſſed, as you ſee it in the index.

Should the purpoſe intended be complicate, and incapable of being expreſſed by two marks, I place the figure, expreſſing deſign, firſt; and thoſe marks which expreſs the peculiarity after it. Thus;

The ſituation of the lobſter and crab, amongſt the prominences and edges of hard rocks, impoſed the neceſſity of covering them with ſhells. But the inflexible nature of ſuch a covering, takes away from the poſſible power of each diſtinct limb. Nature, therefore, has provided for the inconvenience, by multiplying the number of the legs.

The peculiarity is here expreſſed by C̈ 58. The purpoſe is complicated, I therefore expreſs it thus, in the index,—304. Ä 58, or the deſign of the number of the legs.

The human mind often diſcovers the exact relation of circumſtances to powers, and from knowing the ſucceſſive varieties of the one, is able to ſpecify the correſpondent ſucceſſive varieties of the other. This, perhaps, is the rareſt and moſt arduous attainment of philoſophy. I record it in the index, by putting the figure expreſſive of law, before the mark expreſſive of power, in the firſt column; in the ſecond column, the mark correſpondent to the thing, the power, or the means, connected.

EXAMPLE.

"The quantity of ſeramentum in the cavity of the ear increaſes, as the number of hairs in the ſame cavity diminiſhes. It abounds in the human being, and in the ſheep. Birds, whoſe ears are covered with feathers, have none of it." c Ë expreſſes ſeramentum, 69. Law. x̃Ë expreſſes the hairs. It is therefore put down, as I have ſpecified in the index.

The influences, or characteriſtics, belonging, either to circumſtances, means, or agents, are diſcovered by inferences, grounded on a previous compariſon of effects, appearances, and changes. In the columns, at the head of the table, I have given a catalogue of their poſſible diſtinctions, or of the words, appropriate to them. If therefore, I mean to record thoſe characteriſtics, I place the correſpondent letter firſt, and the mark, expreſſive of the thing to which it belongs, after it, in the firſt column.

EXAMPLE.

"The weight of the air, preſſing upon the body of a middle ſized man, is equal to 15,000 pounds:" in the index it will be expreſſed by 4 I.

EXAMPLE.

"The leading characteriſtic of the Engliſh government, from the time of the Norman Conqueſt to the preſent day, has been the rapacity, with which it has ſeized upon the exiſting, and the reverſionary, wealth of the kingdom. Moſt of its revolutions have proceeded from the exceſſes of its kings, in this reſpect. Indeed there never was a period, in which the reigning adminiſtration was not chiefly diſtreſſed by the neceſſity of new taxes, and chiefly employed in the invention of new reſources, or of ſome new means to enter the pockets of the public. The adulterations of the coin, and the ſubſequent prohibitions of its circulation, the pillage of church property, the invention of patents, voluntary ſubſcriptions, and, above all, of the funding ſyſtem; theſe all have been the inventions of a rapacity, which has changed juſt as the patience of the people became more or leſs reſtive."

Here 562 expreſſes rapacious θ' government. I put the word Engliſh after it in the ſecond column. θ' in the firſt with 562. To analyſe the compoſition of an object, is an important part of philoſophy. When elements are joined together, they no longer retain the appearances of their individual properties; and the toil that ſeparated them from their compounded ſtate, ſo that they may be known individually, is that of much diſcrimination and compariſon. There is a figure in the table, expreſſive of compoſition; and that in the index, preceding the object in queſtion, will always ſpecify any particular inſtance of the knowledge I now allude to.

EXAMPLE.

" After having traverſed over the ſurface of Ætna and ſurveyed its beds of aſhes; its torrents of lava; its diſordered foreſts; its ſhattered cavities; the wide and thronged diſtribution of its rocky fragments; I reſolved to know, if poſſible, the elements of which this mountain was compoſed. The depth of four hundred feet below the ſurface was a ſucceſſion of ſtrata, compoſed of lavas, with intervals of mould and broken ſtones, and other unconnected rubbiſh, whoſe quantity varied, in proportion to the time which preceded the ſucceſſive flow of one lava after another. When I examined the beds of lava, I found they were compoſed of all the varieties, which muſt ariſe from expoſing ſubſtances, ſo diverſified as the ports of a mountain, to a heat, whoſe degree of temperature differs with every difference of place, and with all the changes of cauſe, which muſt ariſe each minute in circumſtances ſo complicate. Here I ſhould put Ætna in the firſt column. In the ſecond, Π expreſſive of mountains in general, and 50. 59. 71. expreſſive of arrangement, compoſition and materials.

I might here produce many other modifications of the enquiries which intereſt the purſuits of philoſophy, and to which the table may be applied, as ſuggeſting the queſtions it ought to aſk, and the index, as recording what it has acquired. I will confine myſelf to one additional caſe. In this complicate ſyſtem of things, powers are ſeldom confined to ſingle effects. Numerous are the directions and objects, to which they extend; and few aſſociations are more beneficial than thoſe which come to life from its whole ſphere of action, whenever the power is mentioned. The word gravity brings all the wonders of the ſolar ſyſtem to operate, with immediate energy, on the mind of an aſtronomer. And if we take proper pains, the words, expreſſive, either of the individual, ſocial, or general powers, in the table, may be rendered equally active in the memory. In caſes of this kind, however, the index can record only by placing the figure, expreſſive of extent, before the mark, expreſſive of power.

The following is an improvement of the preceding philoſophical index, ſuggeſted by Sir Geo. C. "You can ſcarcely conceive of the philoſophical fact or diſcuſſion, which will not relate, either to cauſe, deſign, compoſition, law, relation, or general property. After the firſt column in the index rule five lines; and appropriate each one of them to each of the preceding words; and inſtead of crowding your columns with the figures, expreſſive of them, draw a black aſteriſk, on the lines appropriate to them." By this means you will be enabled, if you traverſe with your eye over any given line, to know all in the book, relating to the ſubject it expreſſes.

	Thing predicated.
	Cauſe
	Deſign
	Law
	Compoſition
	Relation
	Gen. Propty.
	Effect, or end anſwered.
	Page.

When I told you that philoſophy and learning are different things; or that a wide difference ſeparates the man who poſſeſſes, from him who applies knowledge, I wiſhed not to be underſtood to repreſent the application of our ideas as an uncommon, or even as a very difficult, attainment. There is nothing which we are more frequently attempting; there is nothing which we are fonder of attempting. The moſt vulgar minds ſcarcely perceive a ſtrange object, before they begin to account for it, and when their knowledge of circumſtances is full, without any previous diſcipline in the art of reaſoning, they will often ſucceed. In developing ſo complex a ſubject as character, ſome of the keeneſt inveſtigations are to be found amongſt thoſe who, without the advantage of a ſcientific education, have ſeen much of the world and collected many ideas of mankind. The diſaſters of a building, or a piece of machinery, are inſtantly referred to their right cauſe, by thoſe, whoſe avocations lead them to be moſt acquainted with their parts and their ſeveral relations. Indeed, man, if he has ever uſed his mind at all, is ſeldom fooliſh and extravagant, till he begins to inveſtigate before he begins to know.

In philoſophical enquiries, as in every thing elſe which requires great exertion of mind, the progreſs of a man, who wiſhes to improve, is that which begins with very ſimple caſes; or that in which there is no great number of intervening ſteps between the cauſe and the effect. Of this kind are ſeveral queſtions in Geology and Meteorology. Here the powers that can act are few; ſo are the modes of action; ſo conſequently are the poſſibilities which call for examination.

EXAMPLE.

"This lake was formerly eighty fathoms deep: Why is it reduced to its preſent depth, or to that of ten fathoms only? A lake, formerly, expanded itſelf over this valley: Why, on the ſame ſpot, do I ſee nothing now but a moraſs, interſected by a narrow ſtrip of water?"

ANSWER.

A lake, excepting in volcanic countries, can be affected by two powers only. Firſt, By the drifting power of the winds, loaded with the light particles of ſome looſe duſt in the neighbourhood. Secondly, By the depoſitions of the vegetable and mineral ruins, which the torrents, flowing into it, are charged with, when flooded, or when their waters have recently waſhed ſome ſoil, that is commonly expoſed to the changing influence of the air, and its concomitant circumſtances. When thus much is known, where is the difficulty, by one glance of the eye, caſt over the neighbouring country, of determining which of the two powers have acted in the propoſed inſtance.

EXAMPLE.

EXAMPLE.

"In this country we have perpetual rains: Beyond thoſe mountains the weather is eternally ſerene and fair. Whence the rain here; why the fairneſs that is permanent there?"

ANSWER.

You cannot be ignorant that the winds, which blow over the ocean, are loaded with water. There is but one power that can bring down this water, and that is the cold that condenſes it. The tops of thoſe mountains are thus cold, and conſequently you owe the rain to their influence. But if the rain fall here, there can be no more in the atmoſphere to fall in another place; and conſequently the very ſame cauſe which gives you wet, gives your neighbours fair weather.

In mineralogy, the queſtions that occur do not admit of anſwers, equally ſummary with the preceding. They ſuppoſe an acquaintance with a greater number of powers, whoſe ſeveral poſſibilities of action are to be diſtinctly examined. But here, again, the cauſe and the effect are ſo cloſely connected, that I know no inſtances, in which the firſt efforts of an inveſtigating mind can be exerciſed with greater effect, and with greater variety; for there are ſcarcely two ſpecimens that ſhow the ſame appearances.

EXAMPLE.

"This ſtone, which I found in a gravel pit, on the ſummit of yonder high ground, is round and ſmooth; whereas ſtones of the ſame kind, in different circumſtances, are jagged and rough. Its corners muſt have been rubbed off; and if ſo, it muſt have been a long time in motion." There are but three powers in nature, which are attended with long and conſtant motion; the air, the waters of rivers, and the waters of the ſea. The air cannot move ſtones; the waters of rivers move in one direction; and therefore can affect the ſurface and edges only. But the ſea, for thouſands of years, tumbles and toſſes about, whatever light ſubſtances are placed near its edge. Its waves, conſequently, muſt have given its form, and the ſmoothneſs of its ſurface to this ſtone."

EXAMPLE.

"Numerous are the ſpecimens of minerals, in which the part torn from its matrix, is a fine granite. On that granite you may obſerve an imbedded pebble; upon that pebble, rock cryſtal; in thoſe cryſtals, fragments of pyrites; and upon thoſe cryſtals, maſſes of lead ore."

ANSWER.

"Here, as in the preceding inſtances, you muſt begin with ranſacking for the ſeveral powers, which could have poſſibly acted in the production of each appearance. Firſt, By looking at the granite through a magnifier, you diſcover it to be a compound of different ſtones, divided into ſmall fragments, having ſharp edges and points, rough and flat ſurfaces, and without any appearances, ſignificant of promiſcuous friction, ſimilar to that which takes place in the ſea. Theſe fragments, then, could never have been in that ſituation, in which the motive powers of the ſea could have acted, or they could never have formed part of the ſea ſhore, where alone ſand and round pebbles are ſmoothed and poliſhed. But the pebble is ſunk into them; they muſt, therefore, ſome time or other, have been ſoft with fluidity. Now there are two kinds of fluidity; that of fire, and that dependent on the mixture of aqueous particles. Here you muſt go on, as you have done before. What are the effects of fuſion? Roundneſs in the angular parts of the body, a diſſipation of volatile ſubſtances, and an amalgamation of ſuch as are fuſible. But in the granite, you diſcover no rounded angles. It contains volatile bodies, that are not diſſipated; and fuſible bodies, that are not amalgamated. You therefore conclude, that the granatical appearances of the ſpecimen do not depend on fuſion.

Let us next have recourſe to the liquidity of water. The particles muſt have been once looſe;

and in this ſtate, water may have inſinuated itſelf between the diſtinct particles, ſo as to make it perfectly impreſſible, or liable to give way to any weight, like that of the pebble, which may fall into it. Here you muſt again ranſack your mind for poſſible powers; or you muſt aſk yourſelf what the powers are, to which this effect can be aſcribed. Firſt, A great preſſure, which will ſqueeze out the water, and bring the particles near enough to adhere: or, ſecondly, a fine depoſition, which by filling the interſtices, will extrude the water. The firſt, is rendered impoſſible, by the irregular terminations and configurations of the parts, which prevent ſuch a degree of contact as is neceſſary to adheſion. The ſecond is rendered probable, by the certainty that the ſuppoſed depoſition muſt take place, wherever there is ſuperincumbent water. It is rendered probable, likewiſe, by the appearance of the interſtices, which are always filled with a cement, likely to be formed in ſuch circumſtances. Thus much for the granite, and the impreſſion made in it. The next thing is the cryſtal. What are the powers, which form a cryſtal?

1ſt. A ſuſpenſion of parts, very much divided in a fluid.

2dly. The removal of all groſs parts, which would keep theſe parts at a diſtance.

Now theſe powers may act ſubſequent to the formation of the granite. After the depoſition of the cement, we have nothing but the lighter particles, floating in the ſuperincumbent fluid; and conſequently thoſe, which in a ſtate of reſt, muſt fall the laſt. The cryſtals, then, will neceſſarily lie on the ſurface; and they will be pellucid, unleſs other particles, which are opake, and in minuteneſs, nearly equal to that of the cryſtal, are depoſited at the ſame time. This is the caſe, when the fine calces of metals float in the liquid: for as they in tenuity nearly equal the particles of ſilex, they will not leſſen the proximity that is neceſſary to cryſtalization. They will only affect the colour. But there are gradations in the minuteneſs of parts, neceſſary to cryſtalization: and hence you can place no end to the ſucceſſion of their effects. I cannot quit this caſe, without acquainting you with thoſe auxiliary powers, which may much co-operate: and if they do co-operate, very much forward the peculiarities I have been explaining. If the proceſs ſhould take place in the bottom of the ſea, it takes place in the undiſturbed reſt of ages. It may be added, that it is expoſed to the influence of an immenſe preſſure to that of a hundred of fathoms of water, which, of itſelf, would bring the ſeveral particles that are floating in the fluid, to their greateſt poſſible nearneſs to each other.

I have been recommending to you caſes for your improvement, in the art of philoſophizing, in which the powers, poſſibly active, are few; in which they are eaſily known; and in which, neither their own, nor the character of their effects, is much diverſified, by oppoſing, or counteracting powers. A man may be a long time verſed in ſpeculations of this kind, before his reaſon or comparing energies are adequate to thoſe deeper inveſtigations, which relate to the powers, and to the correſpondent changes of organized ſyſtems. Here, when one ſpring of action is touched, it is poſſible that a legion of ſympathetic principles may be let looſe. Here the ſubject operated upon, is that of infinite complication, in which the moſt ſtriking effect is often to be inferred from a number of ſubordinate effects, each one of which may as well proceed from other cauſes, as that which is really active. I allude here to the analyſis of the human mind; to the developement of human character; and, above all, to that vaſt combination of effects, which pours upon the obſervation, when multitudes of minds and their complex means of action, are under the influence of contending or co-operating principles.

How ſublime is the ſway of philoſophy, when it gives its commanding word, and ſpreads its deluge of light over the wild chaos, in which the prejudices and the paſſions, the profligacies and the virtues, the folly and the wiſdom of thouſands, involved in one boiling agitation, are inſtantly reduced to order, ſo that each diſcordant element is referred to its origin, and the whole ſcene changed from apparent uproar and confuſion, into that of the moſt delicious harmony and beauty! But here the ſucceſsful inveſtigator diſciplines himſelf in ſimple caſes, and from the experience, acquired by numerous trials of this kind, he is enabled to advance into more abſtruſe refinements. With regard to the human mind, his firſt attention is to facts, where he can have little doubt that one power only acts. He records the effects of the power in the manner I have already deſcribed. He familiarizes his mind, by frequent recurrence to his own deſcription of theſe effects. Hence, whenever effects of a ſimilar character occur to his obſervation, he becomes almoſt ſure of the fountain, whence they flow. An example is neceſſary here. The caſes which moſt unequivocally diſplay the influence of a ſingle power, are thoſe, in which fear is uppermoſt. The improving obſerver fixes his attention on theſe, whenever he meets them. He marks the effects of fear on the eyes, and the other parts of the countenance; on the various tones, expreſſions, and changes of the language; and on the actions and geſtures, that both attend and follow the paroxyſm. He goes through a ſimilar proceſs, with every other paſſion ſingly; and he carefully, and correctly, minutes down the materials he has collected. However, he will not conclude, that from knowing the effects of theſe powers ſeparately, he will be able to reaſon concerning them in joint action; But he becomes anxious to regulate himſelf by further experience: and is therefore, eagerly hunting after caſes, in which he has the moſt unequivocal evidence, that the joint influence I allude to is active. The ſtudy I am recommending, is beſt applied to thoſe inſtances, in which human nature has not yet learnt to conceal the moſt prominent appearances, or expreſſions of its feelings. I ſay, the moſt prominent; for there are ſome that can never be concealed: and it is by theſe, when you are well inſtructed, that you will be able to guide yourſelves. Children, women, individuals, trained at a diſtance from large towns, or in very plain and ſimple concerns; in them the expreſſions of every diſtinct paſſion are full, and ſo ſtrongly marked, that the roughest pencil may take them down; but, when well inveſtigated and conſidered, they will diſcover ſymptoms of their internal cauſes, that will betray the ſame cauſes in the courtier; and in all thoſe who act under the influence of paſſion, diſguiſed by hypocriſy.

The progreſs that is neceſſary in marking down the effects of ſingle and uncombined powers, on the organized ſyſtem of individuals, will be experienced by thoſe, who rightly purſue the conſequences of thoſe effects, in the variety and full extent of their direction. Let us take any one of the paſſions for an example; the moſt powerful, perhaps, is the beſt for illuſtration.

"Fear renders the countenance pale, the lips blue and quivering, the mouth dry." In other words, it checks the courſe *of the blood in the extremity of the veſſels.* Follow this ſingle effect in its conſequences.

1ſt. Theſe extreme veſſels are placed in every part of the body: therefore the expreſſions of the face will have their reſemblance over the whole external ſurface, which will neceſſarily loſe its colour, and have all its ſecretions impeded.

2dly. Thoſe muſcles, whoſe fibres, though very active, are minute, and conſequently owe the ſupplies of their energy to the circulation, in very minute veſſels, muſt all of them be immediately affected: in other words, they muſt loſe, in a greater or leſſer degree, their powers of motion.

Here then you have to look for muſcles of this kind. The firſt are in the head, I mean the occipital. Their fibres, deprived of their uſual ſupplies, become incapable of balancing each other; ſome are weakened, others are tightened, or convulſed; ſo that the hair muſt riſe in all directions: 'Steteruntque comæ.' The next muſcles are thoſe of the palpebræ; they become enfeebled; and of courſe are pulled upwards by the contraction of the occipital: hence the look of fear is the ſtare of a wide-opened eye. The muſcles of the larynx are compoſed of very minute fibres; conſequently the power of the voice, if not entirely loſt, is much affected. The ſphincter of the mouth becomes convulſed, for the ſame reaſons; and hence the trembling of the lips. A ſimilar change takes place in the ſphincters of the rectum and the bladder; and it is the common attendant of great fear that the fœces and the urine are not retained. But the muſcles are not thoſe parts of the human body, which are alone fed by minute veſſels. You will now take the table of parts into your hand, and fix your mind on the relation of each, to the effect I have ſpecified. This proceſs is ſimple; but it will carry you through a vaſt progreſſion of appearances.

You will remember that I have confined you to the conſequences of the power, acting in one degree; it will be your buſineſs to reaſon on the various degrees of its influence; and from what you ſee, to infer what muſt attend an increaſe or a decreaſe; and to ſeize opportunities for correcting by obſervation theſe deductions of your reaſon. I took for my example a caſe, in which the new power that is kindled in the ſyſtem depreſſes the energy of the vaſcular organization. If I had taken impetuous deſire, or impetuous anger, the reverſe would have been the conſequence. But I ſhould have followed them through the whole range of their influences; in the ſame manner I ſhould have choſen three or four prominent effects; and from them have determined the general changes that took place. I ſhould then have traced the conſequences of a ſimilar change in all thoſe parts of the ſyſtem, which were furniſhed with a ſimilarity of ſtructure.

Obſerve, however, that the ſame power may produce ſeveral general changes; and after you have inveſtigated the various effects, ariſing from one of theſe, it ſhould then be your buſineſs to fix upon others, and to apply the ſame proceſs to them. Thus:—Having fully unravelled the conſequences, ariſing from the influence of Fear, upon the blood veſſels, I ſhould then turn back, and attend to thoſe, which could not be reduced to the ſame influence. The eye-ſight is made dim by it. Impreſſions, that uſed to be painful, are not felt. Its deafneſs is that which regards no voice of importunity, no tones of diſtreſs, no eagerneſs of expoſtulation. It revolts not at the common offences of the noſtrils and the mouth. In ſhort, ſtriking are the appearances, which can proceed only from a feebleneſs of the nerves: and the philoſopher, when he has determined this change, purſues the conſequences of it, on all parts of the ſyſtem: but firſt on thoſe which are moſt likely to be affected, the brain, above all the reſt; or that organization of nerves, by which the mind more immediately acts. Hence, it will be inferred, that the power of recollection will be impaired; the finer nerves upon which the aſſociation of ideas depends will become inſenſible; and, conſequently, the whole intellectual ſyſtem will be confuſed; and the ſway of cowardice will not only take away the capability of ranſacking for ideas, the beſt and moſt pertinent to the occaſion; but it will take away the power of having any ideas at all. How correctly will the anticipations of philoſophy, in this caſe, be confirmed by the language of experience and obſervation!

Before we proceed, I will briefly recapitulate the leading particulars, to which I have called your attention. I have juſt touched upon the ſimpleſt proceſſes of philoſophy; and have urged them as the earlieſt objects of a philoſophical progreſs. We are, I have ſhown, to begin the inveſtigation of cauſe and effect in thoſe inſtances, in which the feweſt powers can have acted. I have ſpecified the inſtances, whoſe character is of this kind; and conſequently have directed you for your firſt leſſons, to the ſtudy of inert matter. When thoroughly diſciplined in theſe, I have ſuppoſed that you would proceed to the ſtudy of organiſed matter. And I here have deſcribed the progreſs of improvement to be exactly the ſame with that which precedes it; you are to begin with familiarizing yourſelves to the effects of ſingle powers; and from them to riſe to the inveſtigation of more complex caſes. If you are ſucceſsful thus far, you will not ſtop here; but you will advance to what I conſider as the immenſum opus of philoſophy; or to the inveſtigation of cauſes in thoſe compounds, whoſe parts are unnumbered ſyſtems; and whoſe movements, in many caſes, are the effects of the countleſs diſtinct powers, in each of thoſe parts acting in combination.

Sir Iſaac Newton gradually enlarged the graſp of his mind, ſo as to take in the whole ſolar ſyſtem, by paſſing through that very ſeries of proceſſes, which I have been recommending. His mind was firſt fixed on a leaf, as it fell to the ground. He ſaw a whole ſhower of leaves falling in the ſame way. He ſaw every body, by its tendency towards the ground, giving expreſſions of the influence of one power. But if this power was thus general in its influence near the earth, what would it do at the diſtance of the moon? Why ſtop at the moon? Would it not reach to the planets, to the comets, &c. But a power, thus pervading the whole univerſe, muſt belong to each minute part, and bear a relation to each of its numerous poſſible circumſtances, changes, and properties. He purſued his inveſtigations into this infinitude of effects; and his mind penetrated that, which apparently was a chaos before, with all the illumination of a ſun, ſhining into the regions of night.

It was the happineſs of Newton to follow the only right tract of inveſtigation; and when he began, nothing would have ſtruck him, as more improbable, than the ſtupendouſneſs of his own future diſcoveries. The certainty, that ſomething ſimilar may be experienced by ourſelves, ſhould operate as a ſtimulus; and ſhould encourage us to hope, that if with perſevering correctneſs we diſcipline our minds in ſimple caſes, we ſhall ſoon be able to riſe with ſucceſs, into thoſe of the greateſt complication. I know nothing in this reſpect, that ſurpaſſes the preſent ſtate of human ſociety. Combinations of men are maſſes of ſyſtems, ſubject to general forces, ariſing from the union of countleſs powers, which belong to each of theſe ſyſtems. But though the general forces are thus formed of unnumbered elements, they are themſelves limited and determinate. They reſemble the power of gravity, which, though it proceeds from the joint contribution of countleſs atoms, is yet one thing; and in the infinitude of its relations to different effects, may be argued upon as ſuch, ſo that we can ſpeak with preciſion, of the circumſtances which diverſify its influence, and the changes it is capable of producing. The general powers that govern human ſociety, as ſtated in the table, are,

1ſt. Education.

2dly. Religion.

3dly. Government, &c.

Your progreſs here will be to begin with either of the preceding powers; to mark its effects on a few objects; and afterwards to ſpeculate on the neceſſary conſequences of its extending to all objects of the ſame kind. You will then follow this power in your inveſtigations, to the varieties, ariſing from the different degrees of its influence, from the different durations of its influence, &c.

You will then look into the tendencies of the alteration it has produced, and follow them, in their ſeveral connexions. After you have conſidered the power abſtractedly, you will follow it in the different modes of its operation; and, obſerve the ſteps of your firſt proceſs in the inveſtigation of each of them. You will next conſider it as acting by certain means, each of which will have powers, peculiar to themſelves; and from each of them will ſhoot peculiar ramifications of conſequences.

Examples are here neceſſary to illuſtrate what I have deſcribed very generally. I will ſelect for this purpoſe, the power of education. I inveſtigated the hiſtory of ten friends, whoſe knowledge and virtue I moſt reſpected. I found, that they were educated in a ſchool, where the examples they ſaw were not of the moſt favourable character; where the time devoted to improvement, was not an hour in each day; and where the method of inſtruction was looſe, trifling and barbarous. Theſe friends, notwithſtanding, aſcribed all their excellencies to their education; and yet that all was ſuch, that if it belonged to every member in ſociety, would produce that revolution, which if repreſented in proſpect, would be ridiculed as Utopian or viſionary.

1ſt. Their ſcience and literature enlightened every converſation, and introduced improvement and intellectual gratification wherever they went.

2dly. Their minds had ſo many reſources within themſelves, that they deſpiſed all the luxuries, gaieties, and expenſive follies, into which the vulgar and ignorant ſo naturally fly, for gratification.

3dly. There was nothing ſo unlikely as the neceſſity of any law, to ſettle any differences that took place amongſt them.

4thly. They expoſed no human creature to the want of protection, againſt any thing they did.

5thly. Their greateſt activity was kindled, by the deſire of giving enjoyment.

Suppoſe that the power, which did ſo much to a few individuals, were extended to all, and you muſt at once perceive, that law and government become altogether unneceſſary. Of what uſe is law, where no differences can ariſe to be ſettled? Why ſhould vaſt powers be confided to our governors, if we want no protectors? What Nidus remains for the hatching of lawleſs paſſion, when luxury is exterminated? Or how can the rage of ſelfiſh appetites ever prevail, when the ſtrongeſt principle of the heart, is that of benevolence? But, in the inſtance we have ſelected, we have conſidered the power of education, as acting partially, both as to time and excellence. Let it be that which has reigned for ages. Let it be that complete art, to which the experience of ages muſt neceſſarily mature it. And what comprehenſion is vaſt enough to graſp its neceſſary effects? When you have thus ſurveyed the power generally, in its connexion with the numerous objects, of which I have ſelected but a few, proceed to the conſequence of its acting, in different directions. Theſe are ſpecified in the table. 1ſt. Its influence, when directed to the body, or the powers of the body. From the hiſtory of Barbarians, you will find inſtances, in which the attention, clumſily and partially applied, has produced excellencies of muſcular ſtrength and agility, which we regard with aſtoniſhment and incredulity. You will find the time they gave to theſe attainments but ſmall; and you will find the produce of this ſmall time to derive its appearance of greatneſs, ſolely from a compariſon with the inferiority of thoſe, who devote no time at all to the ſame attainments. Fix your mind on the conſequence of devoting much time to the improvement of the body; or of doing it with a deſire of advancing by experience. Follow the progreſs of going on thus, for centuries; and what a proſpect does it give of what the human body might acquire, both in magnitude, ſtrength and agility.

But, ſecondly, The power of education may be more minutely inveſtigated, by proceeding to a particular examination of its connection with the ſeveral *individual* powers. The table will direct you, firſt, to the nutritive power; the ten thouſand varieties of whoſe influence, and of its dependent cauſes, you will have previouſly conſidered.

If, for inſtance, there is a difference in the poſſible conſequences of each meal; trace, in your mind, the neceſſary effects of being taught to regard that difference in each of the unnumbered meals, which take place during life. How important then, to ſociety, muſt every cauſe appear, whether it be a faſhion or a cuſtom, which affects ſuch minute circumſtances as I have now ſpecified. But as you follow education in its connection with the nutritive power, with its various proceſſes, and its various means; ſo you may with the propagating and the motive powers; and with their various grand, and ſubordinate diviſions, as they are marked in the table. You will obſerve, that your attention has been directed to education, in one courſe only of its activity. You may philoſophize, concerning its extenſive influence in ſociety, when applied to the mind, juſt as you have done with regard to it, when applied to the body. You will begin generally, and view it in its relation to the general properties, marked down in the table. You will then conſider it, as connected with each of the individual powers; with their peculiarities of action, and with their numerous means.

I will now ſuppoſe you in poſſeſſion of all the philoſophy, attainable by the methods I have pointed out. I will likewiſe ſuppoſe, that you have recorded and treaſured up your various efforts, according to the method I have already deſcribed. The immenſe powers you have thus gained for further progreſs in the ſublime inveſtigation of truth, may be now eaſily demonſtrated.

You have before you, perhaps, a collection of facts, relative to a particular body of men, derived from the contemplation of their hiſtory, during a certain period of time; you have recorded their changes, and the periods of thoſe changes; as a philoſopher it is your buſineſs to account for them. You will firſt aſk whether any revolution has taken place in the mode and degree of education, given to the public mind, your previous acquaintance, with this power will enable you, immediately to determine the ſhare of its influence in the caſe propoſed; and to ſeparate its effects from thoſe of other powers, which have operated during the ſame period.

And if you have inveſtigated other powers with the ſame minuteneſs and preciſion as you have given to that of education, you will be able to develope every myſtery, and to be delighted with the view of all, as effects which your mind refers to their proper cauſes. A delight, believe me, when poſſeſſed in the leaſt degree, far ſuperior to the moſt intoxicating delirium of ſenſuality.

Again. Suppoſe the paſſing ſcene of the moment to engage your attention, by the magnitude and variety of its changes. Here, again, you will recur to revolutions that take place in the powers that govern ſociety. You will be able to ſee whether the defect is in their general character, or in ſome of their ſubordinate means and dependencies; and, in addition to the ſatisfaction belonging to a philoſopher's mind, when thus employed, you enjoy an opportunity of pointing out evils to thoſe who can mend them; and conſequently apply your knowledge to immediate relief and benefit.

I now proceed to another great qualification of philoſophy; or to point out the proceſs, by which it gradually improves, in the intereſting art of tracing peculiarities to their deſign; or of ſhowing the connexion between the works of nature and the portions they anſwer. Here opens a boundleſs field of enquiry; an endleſs gradation of difficulties; I may add an unfathomable fund of enjoyment and advantage. What can be more exquiſitely delicious to the human mind, than to purſue the mazes, through which the infinite mind moves forward in the production of infinite happineſs? What can meliorate the heart of man more than a devout contemplation of thoſe contrivances, which are varied, without end, ſo as beſt to carry on the ſchemes of eternal and unlimited benevolence? What can ſharpen and ſtrengthen the human invention more than an acquaintance with the means, employed in countleſs diverſities of circumſtances, by that wiſdom, which never errs. I know no piety equal to that of the philoſopher, which I am now recommending; no virtue equal to that of the philoſopher, who is thus ſublimed and purified; nor do I know any genuine ſkill or art, whoſe principles are not thus acquired.

Here, again, we muſt advance from ſimple cauſes, whoſe circumſtances are known and obvious, to ſuch as are more complicate, in which darkneſs

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may ariſe from an entangled co-operation of powers; from remoteneſs of connexion; or from an apparent oppoſition in things probable, to thoſe which are really active.

The quantity, the degree, the duration, and the changes of individual powers, are of all other peculiarities, the moſt eaſily referrable to their deſign. I would, therefore, begin with the ſtudy of theſe. But this will be impoſſible, unleſs you have previouſly employed your induſtry, in collecting the circumſtances of the animal, or vegetable, which is the object of your enquiry. Thus now, Suppoſe you wiſhed to know the reaſon of that little nutrition, which is diſcovered in the ſyſtem of the ſerpent kind. All is dark, 'till you know that their poſſible opportunities of feeding are not frequent; and that a rapidity of digeſtion would frequently become the cauſe of their ſtarving.

Again. Towards the cloſe of ſummer, many are the creatures who ſeem to thrive in a proportion, tenfold greater than at any other period. Here the change of nutrition is the object of inveſtigation: and the deſign of it is obvious to thoſe who know the hiſtory of theſe animals. For they know, that a proviſion muſt now be laid up for winter, when the circumſtances of their animal exiſtence, during winter, is ſuch, that they can live only on their own fat.

After you have ſtudied the general properties of the individual power, you then proceed to inveſtigate the intention of its various means. Whereas, if you *begin* with the means, all will be dark; for they are all regulated by the character and extent of the powers to which they are appropriate. The uppermoſt ſtomach of a cow will here ſerve for an example. Its vaſt dimenſions, and its regurgitating capacity. Their deſigns are, in vain, ſought after, unleſs you know the vaſt quantity of nutrition, required by the animal, and the circumſtances of danger, in which this nutrition is collected. The ox-kind cannot live without a great deal of food; but if in the woods they were to ſtay and macerate every mouthful they find, they would, neceſſarily, become the prey of their carnivorous enemies. By the help, however, of a capacious ſtomach, they are enabled, expeditiouſly, to put up what they want in ſtore; ſo as, at their leiſure, to triturate and grind it in circumſtances moſt favourable to their ſecurity.

It is neceſſary to obſerve, with regard to this part of philoſophy, that ſucceſs depends as much upon the order of the powers, which you inveſtigate one after the other, as upon the order with which you ſtudy the properties and dependencies of each diſtinct power. Thus, the nutritive is the regulator, both of the extent and number of whatever other powers the creature enjoys. The nutritive and the propagating regulate the motive powers, and the powers and the peculiarities of the ſenſes, are regulated by thoſe of the nutritive, the propagating and the motive. In the table I have arranged both powers and means, in the ſucceſſion, the moſt favourable to the inveſtigation of deſign. I would apprize you, however, that by a miſtake in copying, the propagating is placed before the nutritive power. This error can have no material effect on thoſe who are acquainted with it.

I would here obſerve, that the table and the index not only help us, in recording what is done on the ſubject of deſign, but in directing our minds to the objects which are to regulate their notice. Their arrangement ſuggeſts to us, likewiſe, our method of proceeding, when we are preſt, either as to time, or the tranſiency of our opportunities. When nothing is known of the object we meet with, we ſhould always attend, firſt to the parts, the circumſtances, and the activity of its nutritive power: for till we know theſe, all other knowledge will be uſeleſs, or precarious. Your recording index will tell you whether they are known. If they are known, you will then attend to the propagating power. And ſo on in ſucceſſion I do not mean to ſay, that you ſhould neglect the knowledge, relating to other powers, becauſe theſe are not to be had. I am referring to caſes, in which either the time, or the preſſure, of your circumſtances may oblige you to be ſelect. This is often the neceſſity of travellers, when they are rapidly on the wing. It is the neceſſity, likewiſe, of natural hiſtorians, when they meet with rare ſpecimens of plants and animals.

What I have ſaid, concerning the previous diſcipline neceſſary to the forming of good habits in the inveſtigation of cauſe and effect, and of peculiarity and purpoſe, includes the chief requiſites for what I ſpecified as the third part, or function, of philoſophy; or for the reference of different properties and appearances to their common cauſe. By ſtudying each power, and all the minute diſtinctions of itſelf, its means and its effects, you will become perfectly acquainted with its numerous relations and dependencies; conſequently when theſe are mixed you will be able to ſeparate and to claſs them in the order of their cauſes. The ſame may be ſaid of the diſcovery of general laws. By an acquaintance with powers, and their correſpondent circumſtances; by marking the particular varieties which take place when the circumſtances change, we ſoon become able to anticipate conſequences; for, in reality, this is nothing more than knowing what will take place on the repetition of accidents and events, with which we are already acquainted.

However, all I have urged muſt impreſs you with the weight and importance of care and induſtry, in collecting ideas before you begin to apply them. In this buſineſs you cannot commence too early; nor can you purſue it with too much activity; each paſſing moment is rich with its appropriate opportunities; and conſequently, almoſt every moment of our lives may add to the bulk of our collection.

I will conclude with a few ſuggeſtions, concerning the different parts of the table.

The columns, aſſigned to general properties, are intended to include all the qualities that are poſſible to all objects. The appropriate words are very numerous; and preſent too long a liſt of queſtions, to be traverſed in all the diſtinct caſes, to which they are applicable. But it is to be obſerved, that though they are expreſſive of whatever is poſſible; to whatever thing comes to be examined, in moſt caſes, a few of them only will be pertinent. For the purpoſe of ſelecting theſe few words, with as little trouble as poſſible, I have divided the columns, in queſtion, by printing certain general words in Roman letters. By this means, your leading queſtions are reduced to ſix, or ſeven. Is the thing in conſideration what relates to power? If ſo, then the ſubdiviſions of power are referred to. Does it relate to time? If not, then you paſs over to ſpace. If it does not relate to ſpace, you proceed to compoſition, &c. You thus avoid the tædium of queſtioning upon each diſtinct word; for by reducing them under a certain number of general heads, you confine yourſelves to thoſe few general heads.

It is poſſible, that I may have omitted in the table, many words of univerſal import; I have, therefore, left ſpace for the inſertion of them. That part of the index which refers to circumſtances, requires ſome amplification. Under the words, LAND and WATER, are no leſs than four ſubordinate ſubdiviſions; and the notice of theſe will be found neceſſary in giving the hiſtory of animals, if we keep in view the philoſophy of deſign. Thus, now, the phyſiology of many an inſect cannot be known, unleſs when we conſign it to a root. We ſpecify, at the ſame time, that the root is that of a tree; and that the tree is in a ſandy, rocky, or marſhy, ſituation. We thus become acquainted with the preciſe ſituation, to which the animal belongs; and from its ſimilarity, or diſſimilarity, we learn, in moſt caſes, the intention of ſimilarities, or diſſimilarities, that take place in properties, means, powers, &c.

The table is printed, ſo that we may have it always before us, when we read; or in our pockets, when we range abroad. Very ſoon, however, with a little induſtry, we ſhall be ſo familiariſed with leading marks and figures, that we ſhall be able to aſſign their properties to the various parts of our collected knowledge, without a reference to the printed copy. At firſt, we ſhall feel aukwardly and proceed ſlowly, in the diſcipline I have recommended: but it ſoon becomes eaſy; and independently of its being a great aid to improvement, the uſe of it is an exerciſe, which adds, conſtantly, to the energy of our intellectual faculties.

23 OC 62

FINIS.